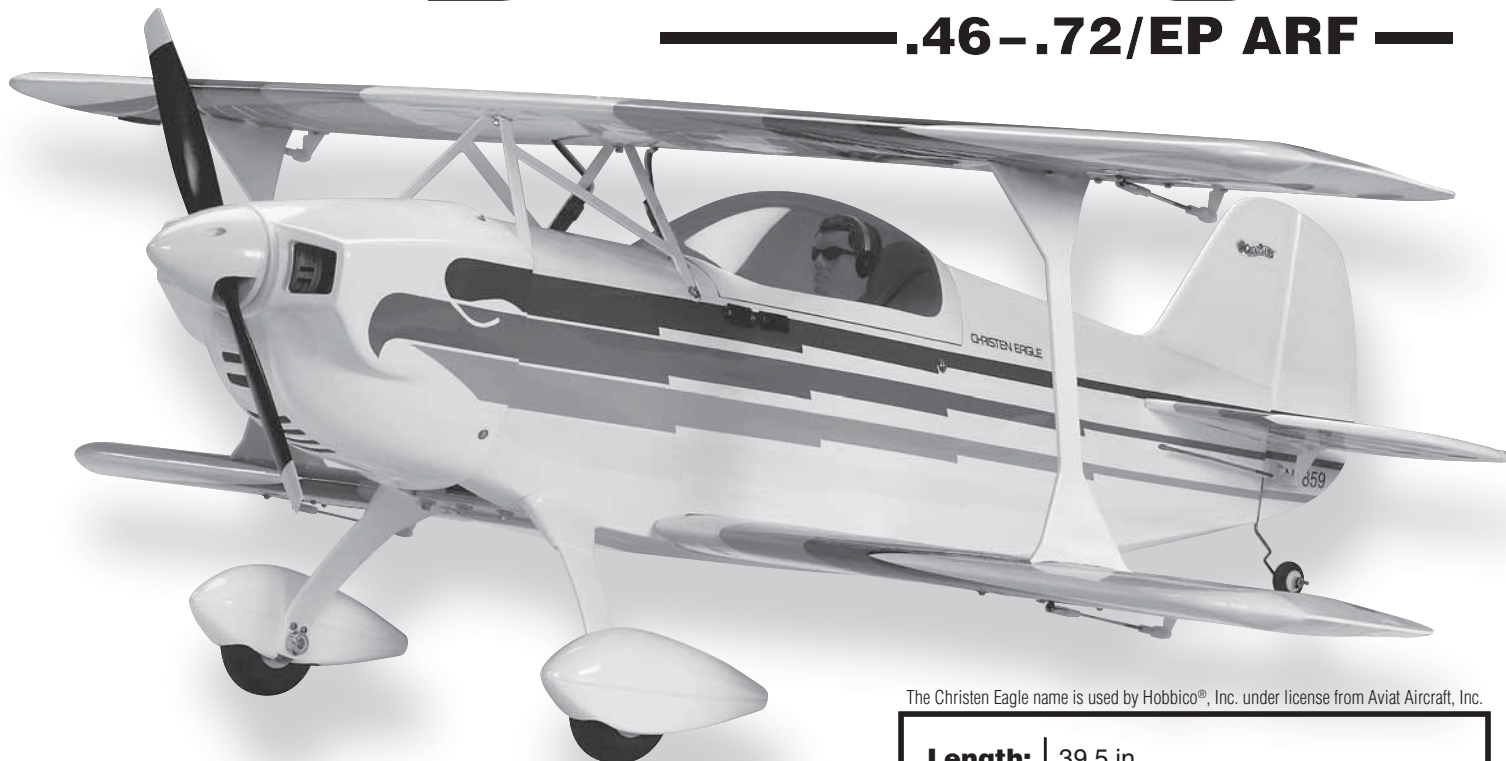


CHRISTEN EAGLE

.46-.72/EP ARF



The Christen Eagle name is used by Hobbico®, Inc. under license from Aviat Aircraft, Inc.

INSTRUCTION MANUAL

SPECIFICATIONS

Wingspan:	Top: 42.5 in [1080mm] Bottom: 40 in [1015mm]	Weight:	5.75–6.25 lb [2610–2830 g]	Length:	39.5 in [1005mm]
Wing Area:	441 in ² [28.4 dm ²]	Wing Loading:	30–33 oz/ft ² [92–101 g/dm ²]	Radio:	4-Channel minimum with 4–7 servos and standard size receiver
				Engine:	.46–.55 cu in [7.5–9cc] two-stroke .72 cu in [12cc] four-stroke RimFire™ .55 (42-60-480) brushless outrunner motor

WARRANTY

Great Planes® Model Manufacturing Co. guarantees this kit to be free from defects in both material and workmanship at the date of purchase. This warranty does not cover any component parts damaged by use or modification. **In no case shall Great Planes' liability exceed the original cost of the purchased kit.** Further, Great Planes reserves the right to change or modify this warranty without notice.

In that Great Planes has no control over the final assembly or material used for final assembly, no liability shall be assumed nor accepted for any damage resulting from the use by the user of the final user-assembled product. By the act of using the user-assembled product, the user accepts all resulting liability.

If the buyer is not prepared to accept the liability associated with the use of this product, the buyer is advised to return

this kit immediately in new and unused condition to the place of purchase.

To make a warranty claim send the defective part or item to Hobby Services at the address below:

Hobby Services

3002 N. Apollo Dr. Suite 1
Champaign IL 61822 USA

Include a letter stating your name, return shipping address, as much contact information as possible (daytime telephone number, fax number, e-mail address), a detailed description of the problem and a photocopy of the purchase receipt. Upon receipt of the package the problem will be evaluated as quickly as possible.

READ THROUGH THIS MANUAL BEFORE STARTING CONSTRUCTION. IT CONTAINS IMPORTANT INSTRUCTIONS AND WARNINGS CONCERNING THE ASSEMBLY AND USE OF THIS MODEL.



Champaign, Illinois
(217) 398-8970, Ext 5
airsupport@greatplanes.com

TABLE OF CONTENTS

INTRODUCTION	2
AMA	2
SAFETY PRECAUTIONS	2
DECISIONS YOU MUST MAKE	3
Radio Equipment	3
Power System Recommendations	3
Propeller	4
Batteries and Charger	4
ADDITIONAL ITEMS REQUIRED	4
Required Hardware and Accessories	4
Adhesives and Building Supplies	4
Optional Supplies and Tools	4
Building Stand	5
IMPORTANT BUILDING NOTES	5
ORDERING REPLACEMENT PARTS	5
KIT CONTENTS	6
PREPARATIONS	7
ASSEMBLE THE WINGS	7
INSTALL THE TAIL SURFACES	11
INSTALL THE TAIL PUSHRODS AND SERVOS	14
ASSEMBLE AND INSTALL THE LANDING GEAR	15
INSTALL THE POWER SYSTEM	16
Glow Engine Installation	16
Brushless Motor Installation	21
FINISH THE MODEL	23
Install the Receiver and Battery	23
Install the Cowl and Spinner	24
Install the Wings and Struts	25
Install the Canopy/Hatch	27
Apply the Decals	27
GET THE MODEL READY TO FLY	28
Install and Operate the Brushless Motor Battery	28
Check the Control Directions	28
Set the Control Throws	29
Balance the Model (C.G.)	29
Balance the Model Laterally	30
PREFLIGHT	30
Identify Your Model	30
Charge the Batteries	30
Balance Propellers	30
Ground Check	31
Range Check	31
ENGINE SAFETY PRECAUTIONS	31
LITHIUM BATTERY HANDLING AND USAGE	31
AMA SAFETY CODE	31
CHECK LIST	32
FLYING	32
Fuel Mixture Adjustments	32
Takeoff	33
Flight	33
Landing	33



INTRODUCTION

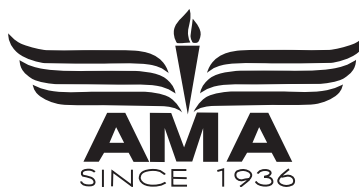
Congratulations on your purchase of the Great Planes Christen Eagle .46 ARF! The highly popular kit sport plane, first released in 1978, was originally produced as a model by Great Planes in 1/3 scale size. The popularity of the 1/3 scale led us to develop a smaller .46 size Eagle for those modelers who prefer to fly smaller planes.

The Christen Eagle has all the great flying characteristics of its larger counterpart that helped make the 1/3 scale successful. In addition, a brushless power system option is detailed in this manual and accommodations have been provided in the fuselage structure for electric components. A wingspan of only 42.5" [1080mm] allows the plane to be transported fully assembled with ease. If you do need to remove the wings, they disconnect from the fuselage quickly by removing four screws, two wing bolts, and sliding the interplane struts out of their slots.

For the latest technical updates or manual corrections to the Great Planes Christen Eagle .46 ARF visit the Great Planes web site at greatplanes.com. Open the "Airplanes" link, then select the Christen Eagle .46 ARF. If there is new technical information or changes to this model a "tech notice" box will appear in the upper left corner of the page.

AMA

Academy of Model Aeronautics: If you are not already a member of the AMA, please join! The AMA is the governing body of model aviation and membership provides liability insurance coverage, protects modelers' rights and interests and is required to fly at most R/C sites.



Academy of Model Aeronautics
5151 East Memorial Drive
Muncie, IN 47302-9252
Tele. (800) 435-9262
Fax (765) 741-0057
modelaircraft.org

IMPORTANT!!!

Two of the most important things you can do to preserve the radio controlled aircraft hobby are to avoid flying near full-scale aircraft and avoid flying near or over groups of people.

PROTECT YOUR MODEL, YOURSELF & OTHERS... FOLLOW THESE IMPORTANT SAFETY PRECAUTIONS

1. Your Christen Eagle .46 ARF should not be considered a toy, but rather a sophisticated, working model that functions very much like a full-size airplane. Because of its performance capabilities, the Eagle, if not assembled and operated correctly, could possibly cause injury to yourself or spectators and damage to property.

2. You must assemble the model **according to the instructions**. Do not alter or modify the model, as doing so may result in an unsafe or unflyable model. In a few cases the instructions may differ slightly from the photos. In those instances the written instructions should be considered as correct.

3. You must take time to **build straight, true and strong**.

4. You must use an R/C radio system that is in first-class condition, and a correctly sized engine and components (fuel tank, wheels, etc.) throughout the building process.

5. You must correctly install all R/C and other components so that the model operates correctly on the ground and in the air.

6. You must check the operation of the model before **every** flight to ensure that all equipment is operating and that the model has remained structurally sound. Be sure to check clevises or other connectors often and replace them if they show any signs of wear or fatigue.

7. If you are not an experienced pilot or have not flown this type of model before, we recommend that you get the assistance of an experienced pilot in your R/C club for your first flights. If you're not a member of a club, your local hobby shop has information about clubs in your area whose membership includes experienced pilots.

8. While this kit has been flight tested to exceed normal use, if the plane will be used for extremely high stress flying, such as racing, or if an engine larger than one in the recommended range is used, the modeler is responsible for taking steps to reinforce the high stress points and/or substituting hardware more suitable for the increased stress.

9. **WARNING:** The cowl, wheel pants, and landing gear included in this kit are made of fiberglass, the fibers of which may cause eye, skin and respiratory tract irritation. Never blow into a part to remove fiberglass dust, as the dust will blow back into your eyes. Always wear safety goggles, a particle mask and rubber gloves when grinding, drilling and sanding fiberglass parts. Vacuum the parts and the work area thoroughly after working with fiberglass parts.

We, as the kit manufacturer, provide you with a top quality, thoroughly tested kit and instructions, but ultimately the quality and flyability of your finished model depends on how you build it; therefore, we cannot in any way guarantee the performance of your completed model, and no representations are expressed or implied as to the performance or safety of your completed model.

Remember: Take your time and follow the instructions to end up with a well-built model that is straight and true.

DECISIONS YOU MUST MAKE

This is a partial list of items required to finish the Christen Eagle .46 ARF that may require planning or decision making before starting to build. Order numbers are provided in parentheses.

Radio Equipment

The Eagle requires a minimum 4-channel radio system with two 44 oz.-in. [3.2 kg-cm] minimum standard sized servos. Two micro servos are required for the ailerons in the bottom wing. Two more micro servos are required if you plan to have the top wing ailerons controlled by their own dedicated servos. If you are installing a glow engine, an additional standard servo is required for the throttle.

Two 12" [305mm] servo extensions are required for the bottom wing aileron servos. If you plan to install aileron servos in the top wing, you will need four more 12" [305mm] servo extensions for a total of six. If you are using a radio system that does not support mixing functions, a Y-harness (dual servo extension) will also be required to connect the bottom aileron servos to the receiver. If you have installed servos in the top wing, two additional Y-harnesses will also be needed for a total of three. A 6" [152mm] servo extension is needed for the receiver pack if you plan to install a brushless motor.

Recommended part numbers for the radio components are provided below:

- ☐ Futaba® S3004 Standard Ball Bearing Servo (FUTM0004) -**OR-** Futaba S9001 Servo Aircraft Coreless BB (FUTM0075)
- ☐ Futaba S3115 Micro Precision Servo (FUTM0415) -**OR-** Futaba S3150 Slim Digital Servo (FUTM0303)
- ☐ Hobbico® 6" Extension Futaba J (HCAM2000)
- ☐ Hobbico 12" Extension Futaba J (HCAM2100)
- ☐ Futaba Dual Servo Extension 6" J (FUTM4130)
- ☐ Ernst Charge Receptacle Futaba J FM (ERNM3001)

Power System Recommendations

The recommended engine/motor size for the Eagle is a .46-.55 cu in [7.5-9 cc] two-stroke engine, .72 cu in [12cc] four-stroke engine, or a RimFire .55 (42-60-480) brushless outrunner motor. Engine and motor order numbers are provided below:

- ☐ O.S.® .46AX ABL w/Muffler (OSMG0547)
- ☐ O.S.® .55AX ABL w/Muffler (OSMG0556)
- ☐ O.S.® .72FS-a Ringed 4-stroke (OSMG0877)
- ☐ Great Planes RimFire .55 (42-60-480) Outrunner Brushless (GPMG4715)

If using the recommended brushless motor, a 60A brushless ESC and motor mount are required:

- ☐ Great Planes Silver Series 60A Brushless ESC High Volt (GPMM1850)
- ☐ Great Planes Brushless Motor Mount Medium (GPMG1255)

Propeller

If you are installing a glow engine, choose a prop based on the engine manufacturer's recommendation. If you are installing the recommended RimFire brushless motor, we suggest a 13x10E APC propeller.

- ☐ APC 13x10 Electric Propeller (APCQ4140)

Batteries and Charger

For a brushless motor installation, two 3350mAh 11.1V Lithium Polymer battery packs connected in series are recommended. Order numbers for the battery packs and series connector are provided below:

- ☐ Great Planes LiPo 3350mAh 11.1V 25C Discharge w/ Balance (GPMP0541)
- ☐ Great Planes Series Deans® U2 to 1 Adapter (GPMM3143)

A cell balancer is required for the LiPo battery pack listed above:

- ☐ Great Planes ElectriFly® Equinox™ LiPo Cell Balancer 1-5 (GPMM3160)

A suitable charger is also required. The Great Planes PolyCharge4™ is designed for LiPo packs only, but is able to charge four LiPo packs simultaneously. The Great Planes Triton2™ charger will only charge one pack at a time, but is capable of charging NiCd, NiMH, LiPo, and Pb acid batteries. Order numbers for both are provided below:

- ☐ Great Planes PolyCharge4™ DC Only 4 Output LiPo Charger (GPMM3015) -**OR**- Great Planes ElectriFly Triton2 DC Comp Peak Charger (GPMM3153)

ADDITIONAL ITEMS REQUIRED

Hardware and Accessories

This is the list of hardware and accessories required to finish the Christen Eagle .46 ARF. Order numbers are provided in parentheses:

- ☐ R/C foam rubber 1/4" [6mm] (HCAQ1000)
- ☐ 3' [900mm] standard silicone fuel tubing (GPMQ4131) (glow engine only)

Adhesives and Building Supplies

This is the list of Adhesives and Building Supplies that are required to finish the Christen Eagle .46 ARF:

- ☐ 1/2 oz. [15g] Thin Pro™ CA (GPMR6001)
- ☐ 1/2 oz. [15g] Medium Pro CA+ (GPMR6007)
- ☐ Pro 30-minute epoxy (GPMR6047)
- ☐ Threadlocker thread locking cement (GPMR6060)
- ☐ Denatured alcohol (for epoxy clean up)
- ☐ Drill bits: 1/16" [1.6mm], 5/64" [2mm], 11/64" [4.4mm]

- ☐ Great Planes Tap & Drill Set 6-32 (GPMR8102) (Glow engine installation only)
- ☐ Tap handle (GPMR8120) (Glow engine installation only)
- ☐ Dead Center™ Engine Mount Hole Locator (GPMR8130)
- ☐ Rotary tool with cutting bit
- ☐ Revell® Premium Soft Handle Knife w/Blades (5) (RMXR6900)
- ☐ Top Flite® MonoKote® sealing iron (TOPR2100)
- ☐ Top Flite Hot Sock™ iron cover (TOPR2175)
- ☐ Panel Line Pen (TOPQ2510)
- ☐ T-pins
- ☐ Household oil
- ☐ Ruler or measuring tape

Optional Supplies and Tools

Here is a list of optional tools that will help you build the Christen Eagle .46 ARF:

- ☐ Great Planes Pro Epoxy 6-Minute Formula 4 oz (GPMR6042)
- ☐ 1/2 oz. [15g] Thick Pro CA- (GPMR6013)
- ☐ 2 oz. [57g] spray CA activator (GPMR6035)
- ☐ 4 oz. [113g] aerosol CA activator (GPMR6034)
- ☐ CA applicator tips (HCAR3780)
- ☐ CA debonder (GPMR6039)
- ☐ Epoxy brushes 6, (GPMR8060)
- ☐ Mixing sticks (GPMR8055)
- ☐ Mixing cups (GPMR8056)
- ☐ Pliers with wire cutter (HCAR0630)
- ☐ Harry Higley's 3/16" Extended Drill Bit (HIGR1020)
- ☐ T.A. Emerald Performance Duster Compressed Air (TAEC1060)
- ☐ Rotary tool reinforced cut-off wheel (GPMR8200)
- ☐ Servo horn drill (HCAR0698)
- ☐ Hobby Heat™ micro torch II (HCAR0755)
- ☐ Precision Magnetic Prop Balancer (TOPQ5700)
- ☐ AccuThrow™ Deflection Gauge (GPMR2405)
- ☐ CG Machine™ (GPMR2400)
- ☐ Hobbico Flexible 18" Ruler Stainless Steel (HCAR0460)
- ☐ Top Flite MonoKote trim seal iron (TOPR2200)
- ☐ Top Flite MonoKote heat gun (TOPR2000)
- ☐ Hobbico Pin Vise 1/16 Collet w/6 Bits (HCAR0696)
- ☐ Hobbico 8-Piece Ball Tip Hex L Wrench SAE (HCAR0520)
- ☐ Hobbico 7-Piece Ball Tip Hex L Wrench Metric (HCAR0521)
- ☐ Great Planes Clevis Installation Tool (GPMR8030)

Building Stand



A building stand or cradle comes in handy during the build. We use the Robart Super Stand II (ROBP1402) for all our projects in R&D, and it can be seen in pictures throughout this manual.

IMPORTANT BUILDING NOTES

- When you see the term **test fit** in the instructions, it means that you should first position the part on the assembly **without using any glue**, and then slightly modify or *custom fit* the part as necessary for the best fit.
- Whenever the term **glue** is written you should rely upon your experience to decide what type of glue to use. When a specific type of adhesive works best for that step, the instructions will make a recommendation.
- Whenever just **epoxy** is specified you may use **either** 30-minute (or 45-minute) epoxy **or** 6-minute epoxy. When 30-minute epoxy is specified it is **highly** recommended that you use only 30-minute (or 45-minute) epoxy, because you will need the working time and/or the additional strength.
- **Photos** and **sketches** are placed **before** the step they refer to. Frequently you can study photos in following steps to get another view of the same parts.
- The stabilizer and wing incidences and engine thrust angles have been factory-built into this model. However, some technically-minded modelers may wish to check these measurements anyway. To view this information visit the web site at greatplanes.com and click on "Technical Data." Due to manufacturing tolerances which will have little or no effect on the way your model will fly, please expect slight deviations between your model and the published values.

ORDERING REPLACEMENT PARTS

Replacement parts for the Christen Eagle are available using the order numbers in the Replacement Parts List that follows. The fastest, most economical service can be provided by your hobby dealer or mail-order company.

To locate a hobby dealer, visit the Great Planes web site at greatplanes.com. Choose "Where to Buy" at the bottom of the menu on the left side of the page. Follow the instructions provided on the page to locate a U.S., Canadian or International dealer.

Parts may also be ordered directly from Hobby Services by calling (217) 398-0007, or fax at (217) 398-7721, but full retail prices and shipping and handling charges will apply. Illinois and Nevada residents will also be charged sales tax. If ordering via fax, include a Visa® or MasterCard® number and expiration date for payment.

Mail parts orders and payments by personal check to:

Hobby Services

3002 N. Apollo Drive, Suite 1

Champaign, IL 61822

Be certain to specify the order number exactly as listed in the **Replacement Parts List**. Payment by credit card or personal check only; no C.O.D.

If additional assistance is required for any reason, contact Product Support by telephone at (217) 398-8970, or by e-mail at productsupport@greatplanes.com.

REPLACEMENT PARTS LIST

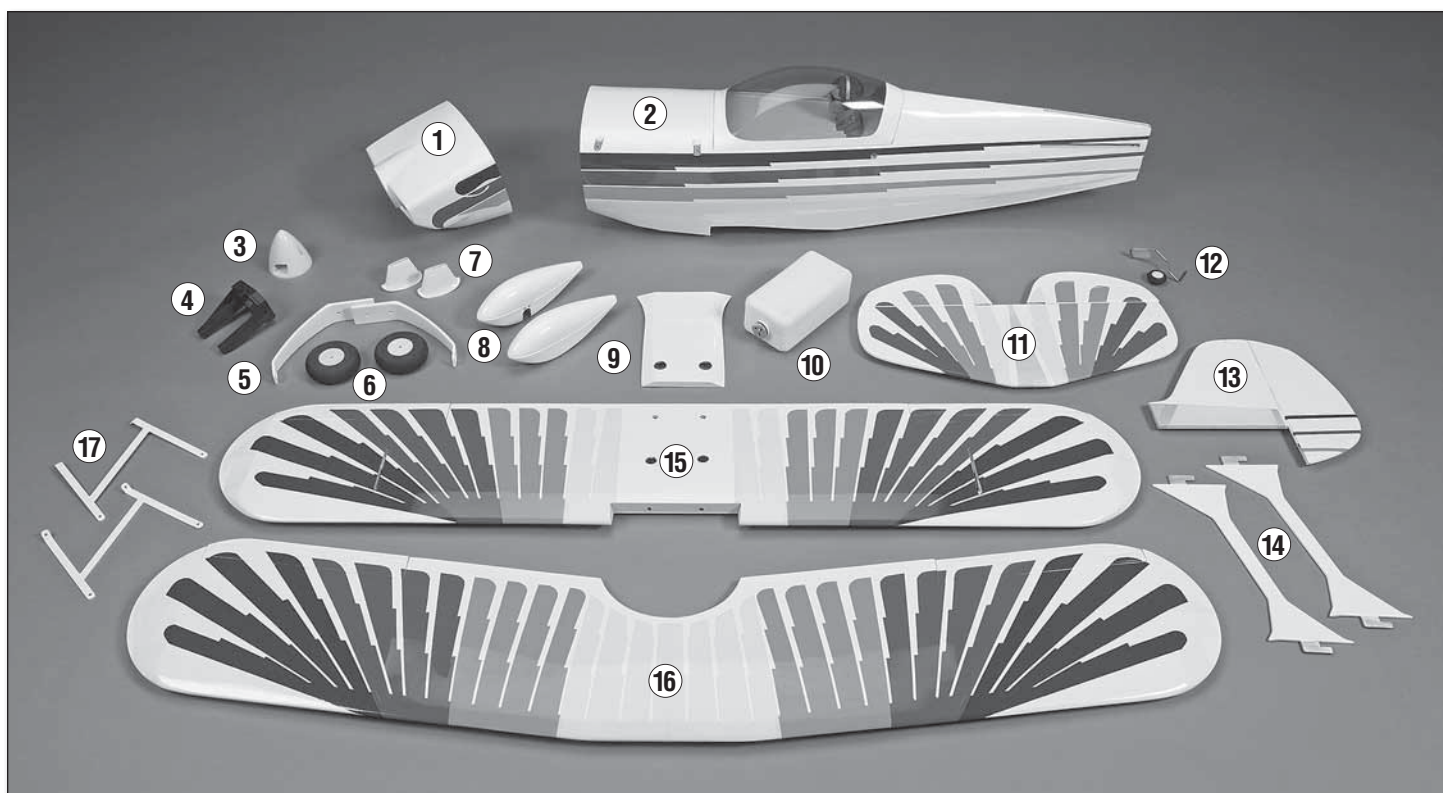
Order No.	Description
GPMA4160	Fuselage
GPMA4161	Top Wing
GPMA4162	Bottom Wing
GPMA4163	Tail Set
GPMA4164	Hatch
GPMA4165	Cowl
GPMA4166	Cabanes
GPMA4167	Struts
GPMA4168	Wheel Pants
GPMA4169	Landing Gear
GPMA4170	Decals
GPMA4171	Spinner
GPMA4172	Landing Gear Fairings
NOTE ►	Full-size plans are not available. You can download a copy of this manual at www.greatplanes.com .

KIT INSPECTION

Before starting to build, take an inventory of this kit to make sure it is complete, and inspect the parts to make sure they are of acceptable quality. If any parts are missing or are not of acceptable quality, or if you need assistance with assembly, contact Product Support. When reporting defective or missing parts, use the part names exactly as they are written in the Kit Contents list.

Great Planes Product Support:
3002 N Apollo Drive, Suite 1
Champaign, IL 61822
Telephone: (217) 398-8970, ext. 5
Fax: (217) 398-7721
E-mail: airsupport@greatplanes.com

KIT CONTENTS



1. Cowl
2. Fuselage
3. Spinner
4. Engine Mount
5. Main Landing Gear
6. Main Wheels

7. Landing Gear Fairings
8. Wheel Pants
9. Belly Pan
10. Fuel Tank
11. Horizontal Stabilizer
12. Tail Wheel Assembly

13. Vertical Fin
14. Interplane Struts
15. Bottom Wing
16. Top Wing
17. Cabane Struts

PREPARATIONS

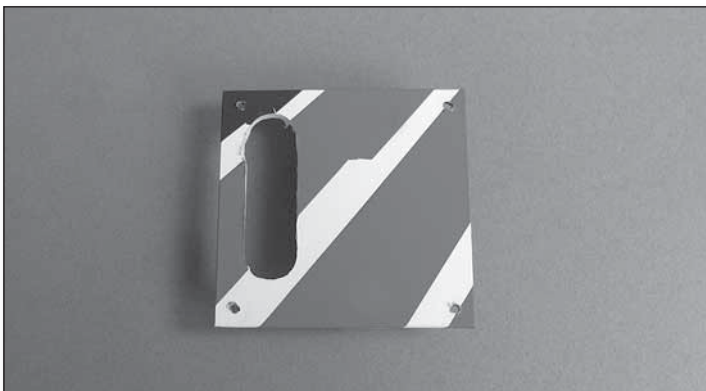
- ❑ 1. If you have not done so already, remove the major parts of the kit from the box and inspect for damage. If any parts are damaged or missing, contact Product Support at the address or telephone number listed in the "Kit Inspection" section on the opposite page.



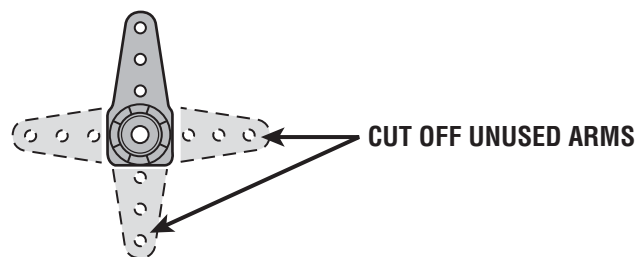
- ❑ 2. Remove the tape and separate all the control surfaces if not pre-hinged. Use a covering iron with a covering sock on high heat to tighten the covering if necessary. Apply pressure over sheeted areas to **thoroughly** bond the covering to the wood.

ASSEMBLE THE WINGS

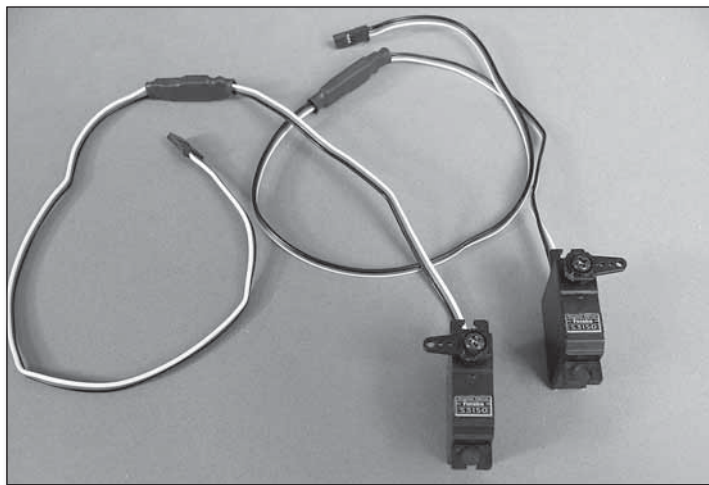
Note: Servos in the top wing are optional. The installation of the servos is the same procedure for the top and bottom wings. The top wing is shown in the following steps. The same procedure should be used to install the servos into the bottom wing.



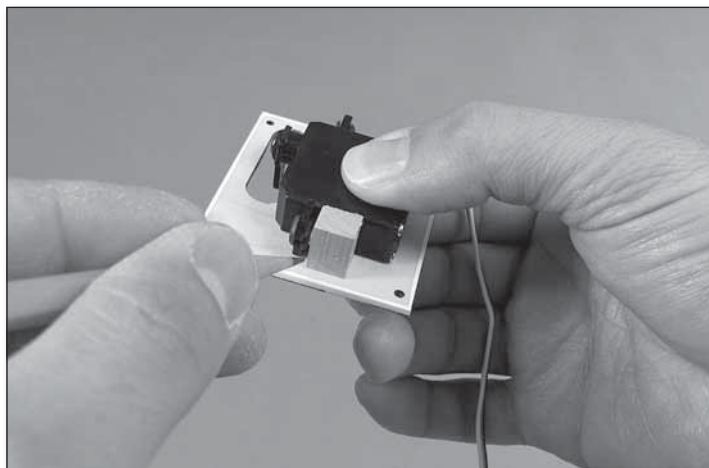
- ❑ 1. If you plan to install servos into the top wing, trim the covering from the servo arm slots in the servo hatch covers using a sharp hobby knife. If you plan to connect the upper and lower ailerons with pushrods and have all four ailerons controlled by the two servos in the bottom wing, then do not trim the covering from the top wing hatch covers. Skip to step #9. After step #9, complete the bottom wing servo installation as described in step #14.



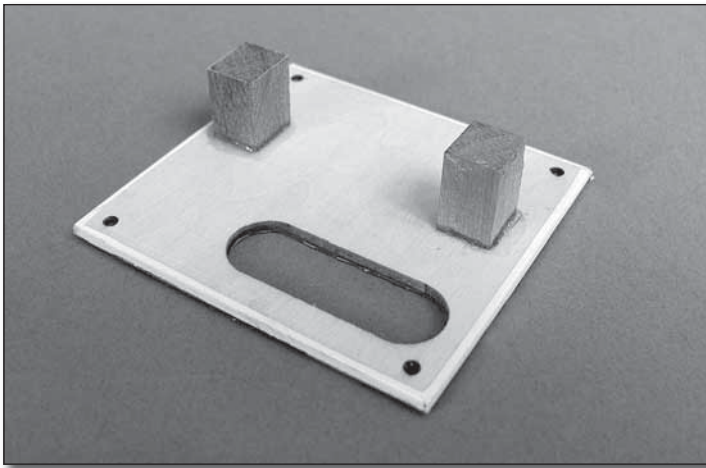
- ❑ 2. Cut three arms from a four-armed servo arm for each aileron servo. Enlarge the outer hole of each remaining arm with a 5/64" [2mm] drill bit.



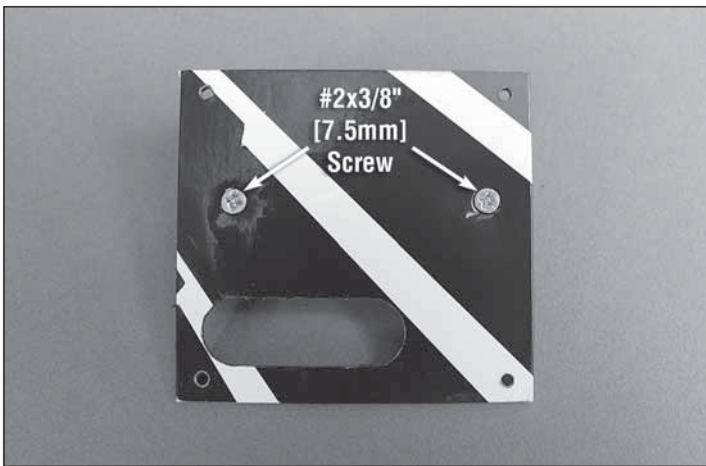
- ❑ 3. Attach a 12" [305mm] servo extension to each aileron servo and secure the connector using tape or heat shrink tubing (not included). Center the servos with your radio system and install the servo arms to the servos perpendicular to the servo cases as shown. Be sure to reinstall the servo arm screws into the servos. Install the rubber grommets and eyelets onto the servo mounting tabs.



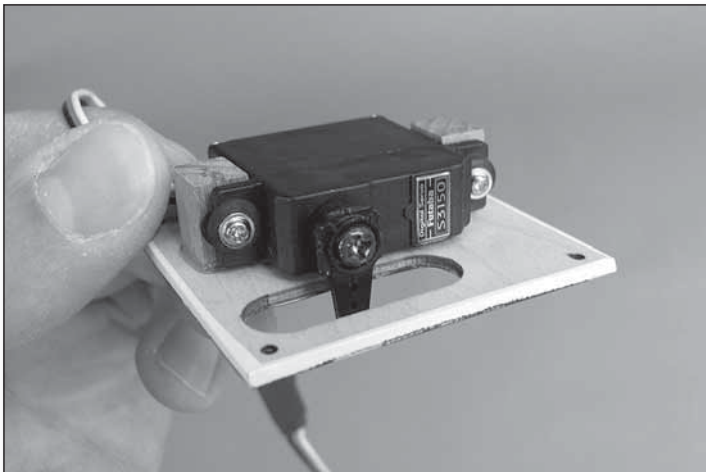
- ❑ 4. Position the servos onto the aileron servo hatch covers with the servo arms centered in the openings. Place an aileron servo mounting block behind each servo mounting tab and mark their locations onto the hatch covers.



□ □ 5. Epoxy the aileron mounting blocks onto the hatch covers. Allow the epoxy to harden completely before moving on.

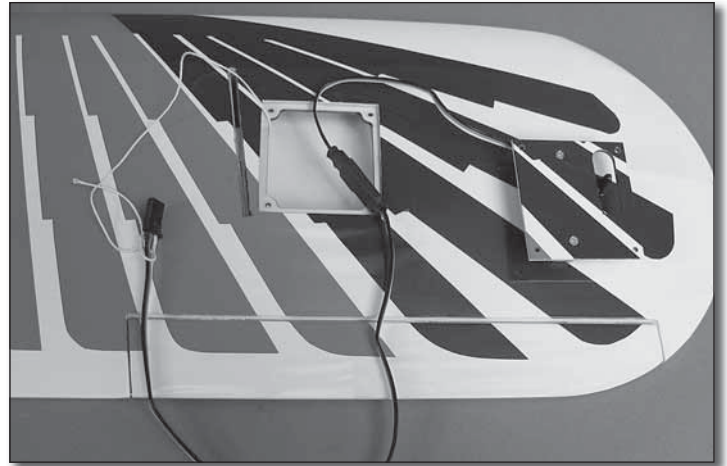


□ □ 6. Drill a 1/16" [1.6mm] hole through the hatch cover and through each aileron mounting block. The hole should be slightly off center to prevent interference when drilling holes for the aileron mounting screws in the next step. Thread a #2 x 3/8" [9.5mm] self-tapping flathead screw into each block as shown.

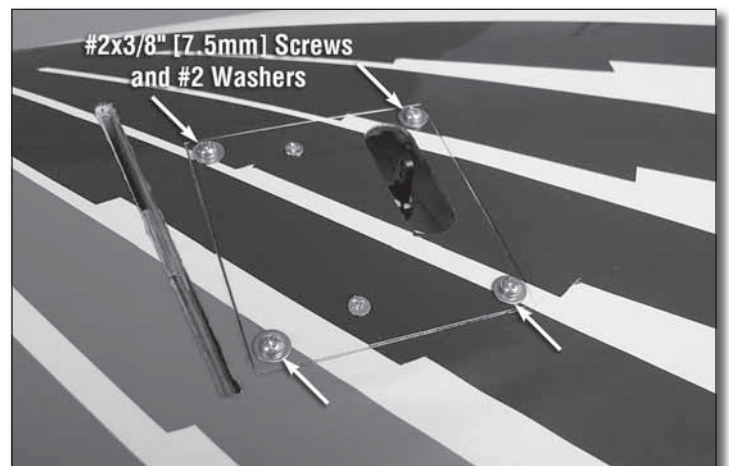


□ □ 7. Position each servo against the undersides of the aileron servo hatch covers between the mounting blocks. Shim the aileron servos away from the hatch covers approximately 3/64" [1.2mm] to isolate it from vibration (a business card folded in thirds works well for this). Drill 1/16" [1.6mm] holes through the mounting tabs on the servo case

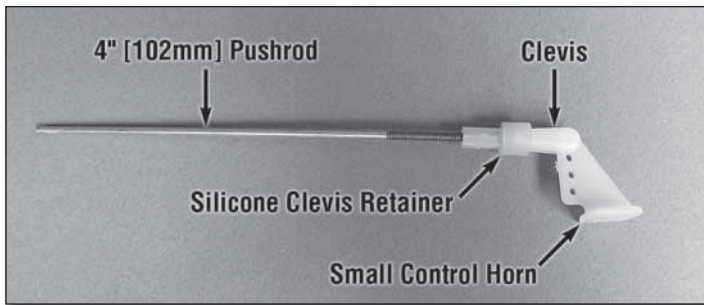
into the blocks. Thread a servo mounting screw (included with the servos) into each hole and back it out. Apply a drop of thin CA to each hole to harden the wood. When the CA has dried, install the servos onto the hatch covers using the hardware supplied with the servos.



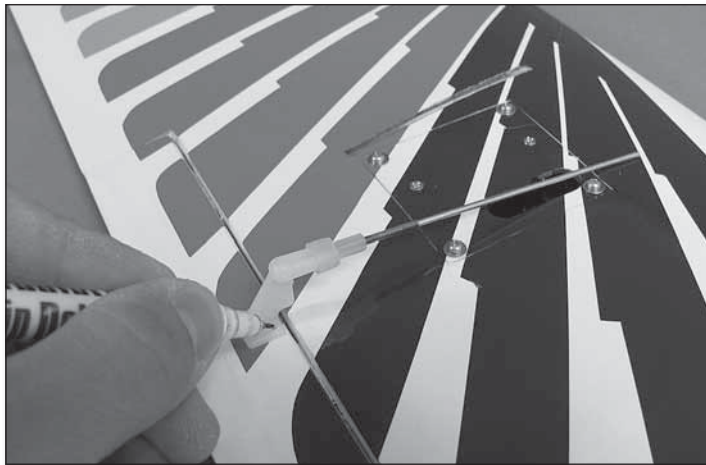
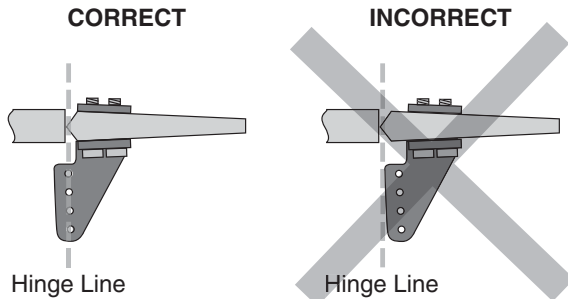
□ □ 8. Use the strings taped inside the aileron servo hatches to pull the servo leads through the wing panels and out the servo lead exit holes.



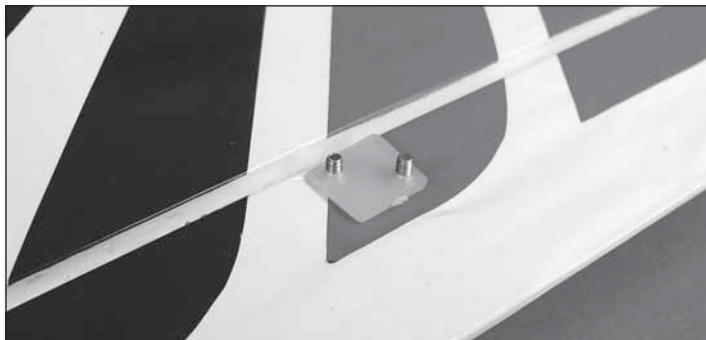
□ □ 9. Thread a #2 x 3/8" [9.5mm] self-tapping screw into each hatch cover mounting hole in the wing and back it out. Apply a drop of thin CA glue to each hole and allow the glue to harden. Install the hatches using eight #2 x 3/8" [9.5mm] self-tapping screws and eight #2 flat washers.



□ □ 10. Thread a nylon clevis 20 complete turns onto two 4" [102mm] pushrods. Slide a silicone clevis retainer onto each clevis and connect the clevises to the outer holes of two small control horns.

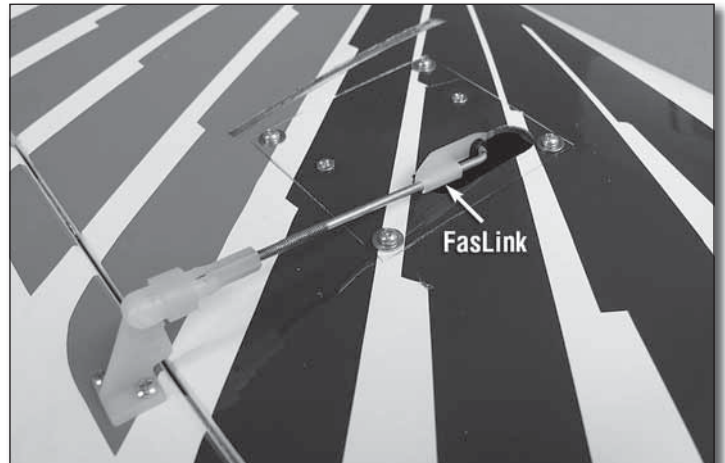
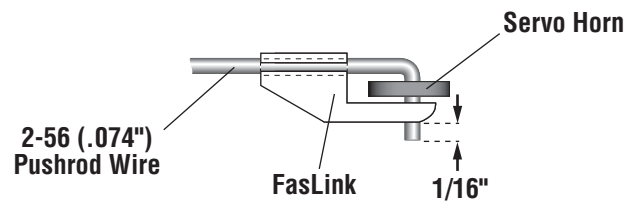


□ □ 11. Position the control horns over the plywood plates in the ailerons (if you cannot see them, hold the aileron at a shallow angle in good lighting or use a small pin to puncture the covering) using the position of the servo arms as a guide. Align the holes in the control horns directly over the aileron hinge line and mark the location of the control horn mounting holes.

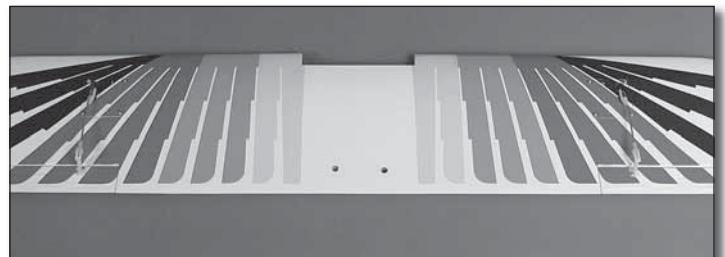


□ □ 12. Drill 5/64" [2mm] holes at the marks you made through the plywood plates. Apply a couple drops of thin CA

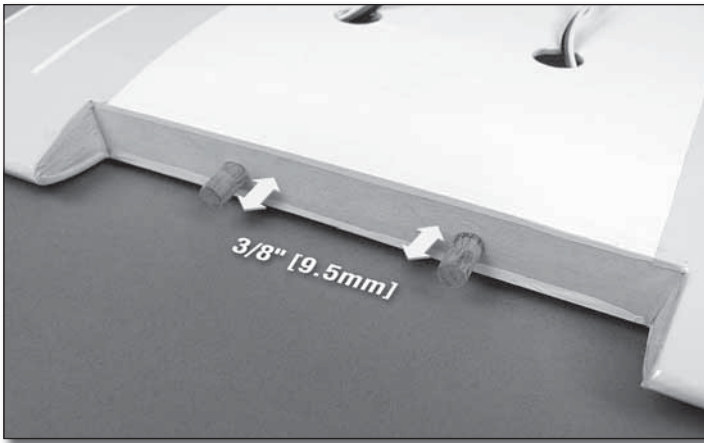
glue to each hole to harden the wood. When the glue has dried, install the control horns onto the ailerons using four 2-56 x 1/2" [13mm] machine screws and the control horn backplates.



□ □ 13. Use tape or a small clamp to hold the ailerons in the neutral position. Make a mark on the pushrods where they cross the outer holes in the servo arms. Make a 90° bend at the mark on the pushrod and cut off the excess pushrod 1/4" [6mm] beyond the bend. Attach the pushrods to the servo arms using nylon FasLinks. Thread the clevises up or down on the pushrods as necessary to center the ailerons with the servo arms centered. When satisfied, slide the silicone clevis retainers to the ends of the clevises to secure them.

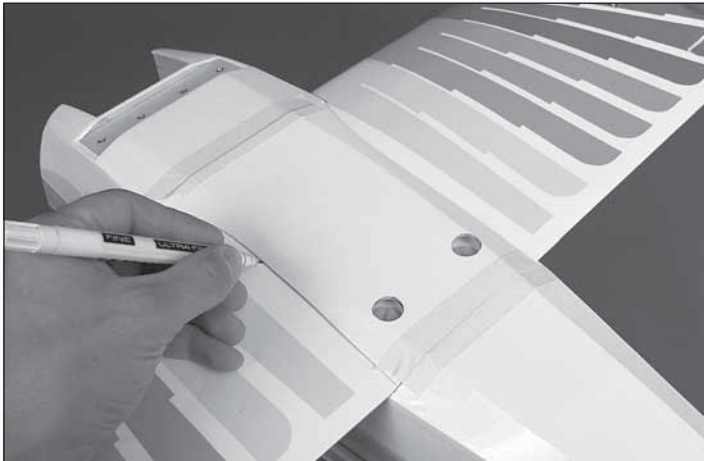


□ 14. Repeat steps 2-13 for the bottom wing.

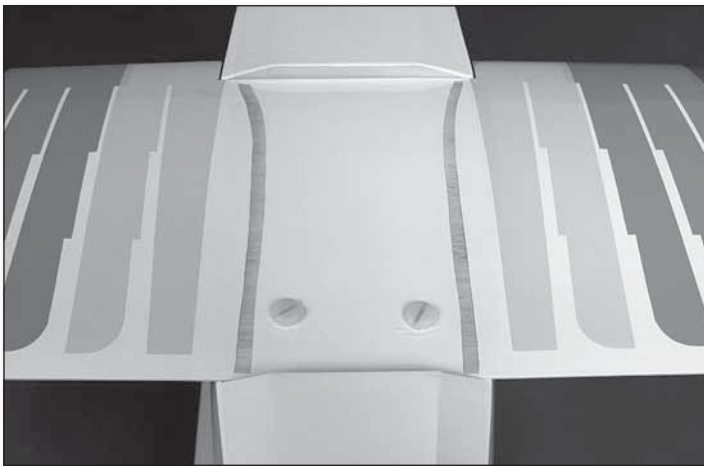


❑ 15. Glue the bottom wing dowels into the holes in the leading edge. Position the dowels so that 3/8" [9.5mm] protrudes beyond the holes.

❑ 16. Mount the bottom wing to the fuselage using two 1/4-20 x 2" [51mm] nylon wing bolts.



❑ 17. Align the belly pan onto the bottom of the wing and tape it in position. Use a felt-tip pen to trace around the belly pan onto the wing.

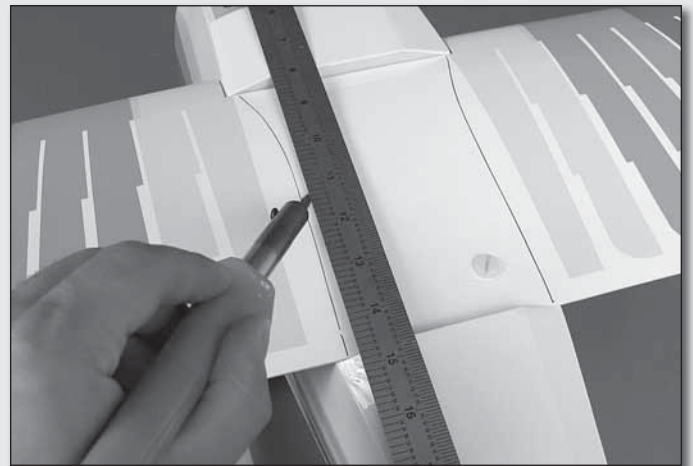


❑ 18. Carefully cut the covering 1/16" [1.6mm] inside the lines you drew and remove a strip of covering approximately 1/4" [6mm] from each side. Use a sharp hobby knife and take care to cut only through the covering and not into the wood beneath. Use denatured alcohol to wipe away the lines you drew (or use CA debonder). See the following **Expert Tip** for an alternative method for removing covering.



HOW TO CUT COVERING FROM BALSA

Use a soldering iron to cut the covering from the area beneath the belly pan. The tip of the soldering iron doesn't have to be sharp, but a fine tip does work best. Allow the iron to heat fully.

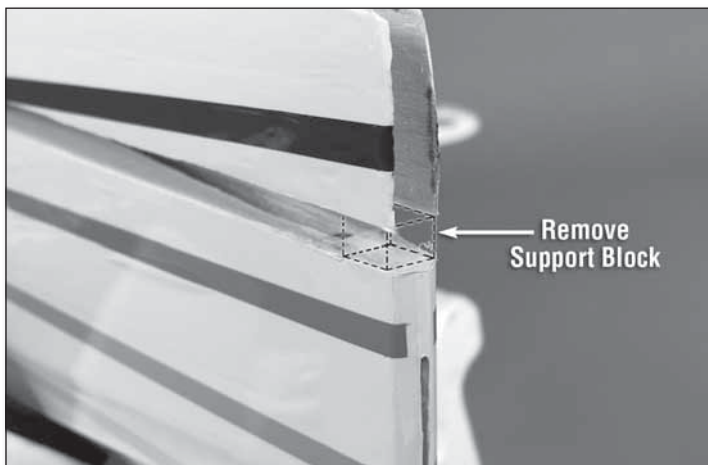


Use a straightedge to guide the soldering iron at a rate that will just melt the covering and not burn into the wood. The hotter the soldering iron, the faster it must travel to melt a fine cut. Peel off the covering.

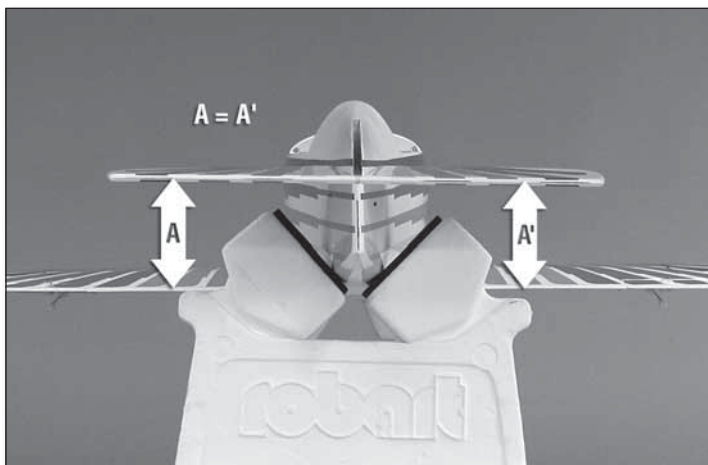


❑ 19. Apply a thin bead of glue along each side of the belly pan and glue it into place on the underside of the wing. Take care not to inadvertently glue the belly pan to the fuselage. Pieces of wax paper can be placed between the belly pan and the fuse to ensure this will not happen.

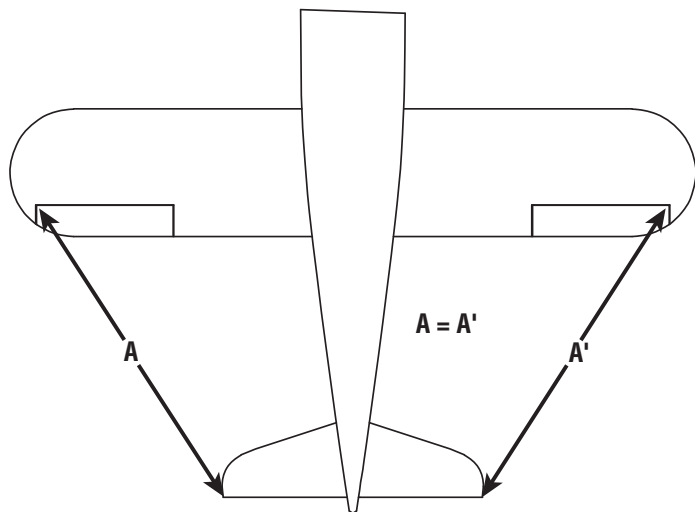
INSTALL THE TAIL SURFACES



- ❑ 1. Carefully cut away the support block at the aft end of horizontal stabilizer slot.



- ❑ 2. Insert the horizontal stabilizer into the stab pocket and center the stab left and right in the fuselage. Stand back 15-20ft [5-6m] and check to be sure the stab is parallel to the wing. If necessary, adjust the stab saddle as needed by lightly sanding it until the stab and wing are parallel.



- ❑ 3. Measure the distance from the corners of the ailerons on the wing to the tips of the stab. Adjust the stab until the distance from the tip of the stab to the wing is equal on both sides. Before gluing the stab, test fit the vertical fin part way into the fuse and confirm the fuse sides fit snugly against the fin. If the fit is loose, leave the fin in place while gluing the stab into the slot and use small clamps to hold the fuse sides against the fin.

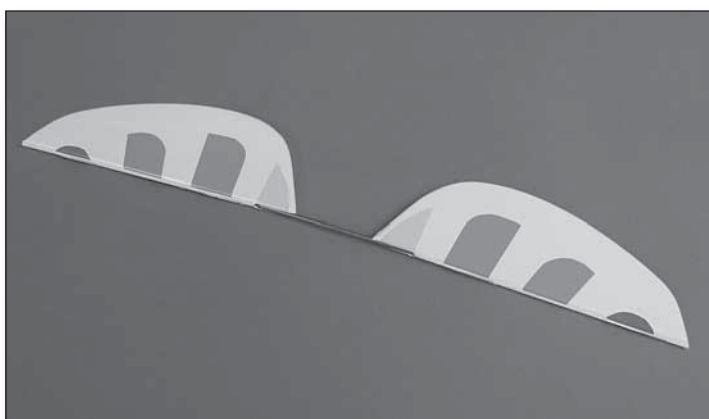


- ❑ 4. When satisfied with the fit, coat the exposed wood of the stabilizer with 30-minute epoxy. For a stronger joint, we recommend also coating the stab pocket with epoxy. Set the stab in position in the stab pocket and confirm that it is centered and parallel with the wing. When satisfied, clean up any excess epoxy from the stab and fuse with paper towels dampened with denatured alcohol. Be thorough when cleaning to prevent a haze left behind on the covering after the epoxy cures. Re-check the alignment. Allow the epoxy to cure undisturbed.

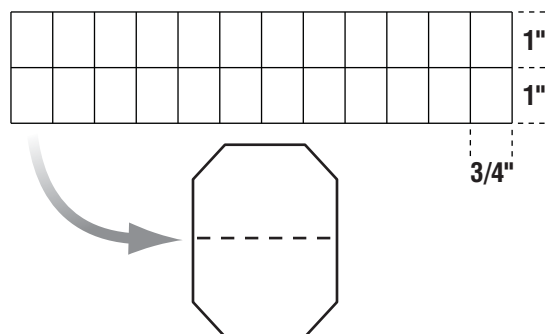


❑ 5. Confirm that the vertical fin is square with the horizontal stab. When satisfied, glue it in place (even with the back of the fuselage) in the same manner.

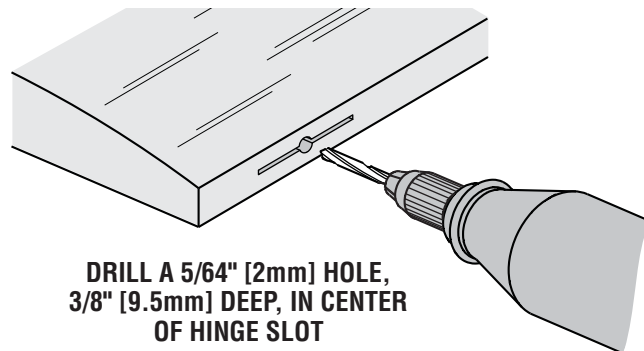
❑ 6. The wing can now be removed from the fuselage.



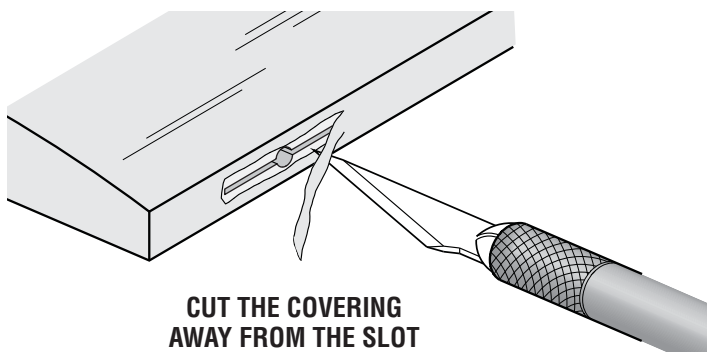
❑ 7. Test fit the elevator joiner wire into the elevator halves. Lay the elevators on your work surface and confirm that they both lay flat. If not, "tweak", or bend the elevator joiner wire slightly until they do. Do not attempt to bend the joiner wire while it is installed in the elevators. Using a straight edge across the elevator halves, glue the joiner wire in place with epoxy. Clean up any excess epoxy with denatured alcohol.



❑ 8. Cut the included 2" x 9" [51mm x 229mm] piece of CA hinge material into 3/4" x 1" [19mm x 25mm] individual hinges. Use a hobby knife or scissors to trim the corners from each hinge to make them easier to insert into the hinge slots.

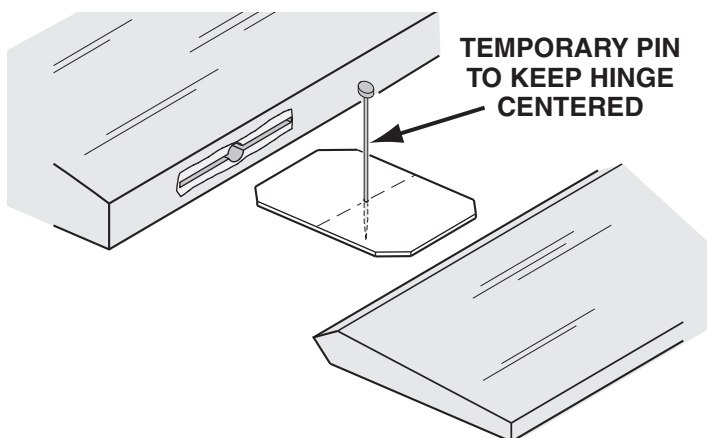


**DRILL A 5/64" [2mm] HOLE,
3/8" [9.5mm] DEEP, IN CENTER
OF HINGE SLOT**

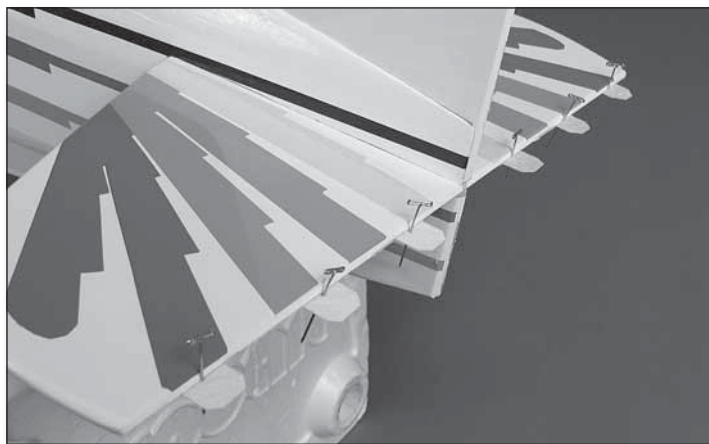


**CUT THE COVERING
AWAY FROM THE SLOT**

❑ 9. Drill a 5/64" [2mm] hole 3/8" [9.5mm] deep in the center of each hinge slot in the horizontal stabilizer and elevators. Use a sharp hobby knife to carefully cut away the covering just around each hinge slot.



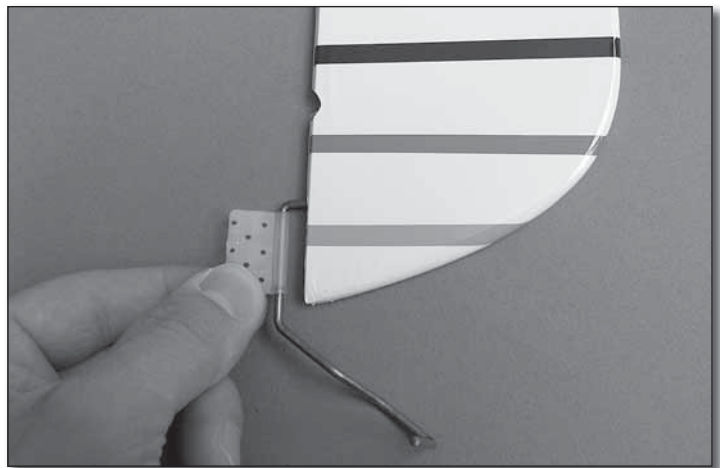
**TEMPORARY PIN
TO KEEP HINGE
CENTERED**



❑ 10. Fit a CA hinge into each hinge slot in the stab. If the hinges are difficult to install, use a hobby knife to slightly enlarge the slots. Push a pin (T-pins work well for this) through the middle of each hinge to keep them centered.



❑ 11. Test fit the elevators to the hinges and align the outside edges with the edges of the stab. Make any adjustments to the hinge slots if necessary.



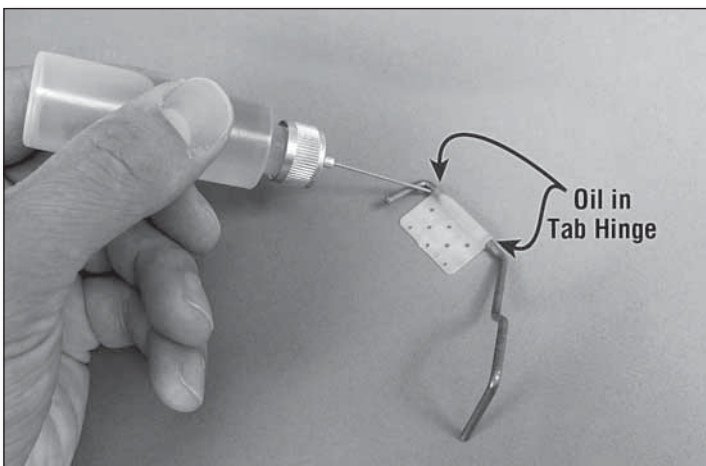
❑ 14. Test fit the tail wheel wire into the hole in the rudder. Test fit the rudder onto the fuselage with CA hinges but do not glue them yet.



❑ 12. Fit the elevator halves to the hinges in the stab. Remove the pins from the hinges and position the elevators against the TE of the stab. The hinge gap between the elevators and stab should only be wide enough to allow a small line of light through. Apply 6 drops of thin CA glue to the center of each hinge on both sides. When the CA has dried, gently pull on the elevators to confirm that they are securely glued in place. The hinges will hold the elevators in place while the epoxy cures.

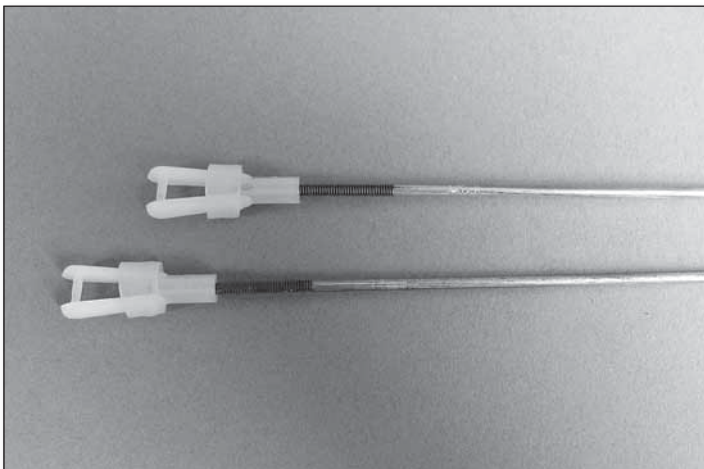


❑ 15. When satisfied with the fit, remove the rudder from the fuse and the tail wheel wire from the rudder. Apply a thin coat of epoxy to the portion of the wire that fits into the rudder as well as to the nylon tab that fits into the fuse. Attach the rudder to the fuse with CA hinges in the same manner you did with the elevators. Wipe away any excess epoxy with denatured alcohol.



❑ 13. Apply a couple drops of oil to each end of the nylon tab on the tail wheel wire.

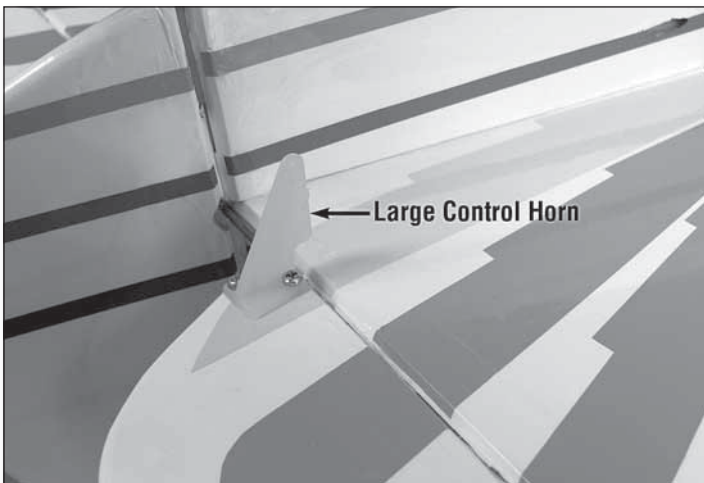
INSTALL THE TAIL PUSHRODS & SERVOS



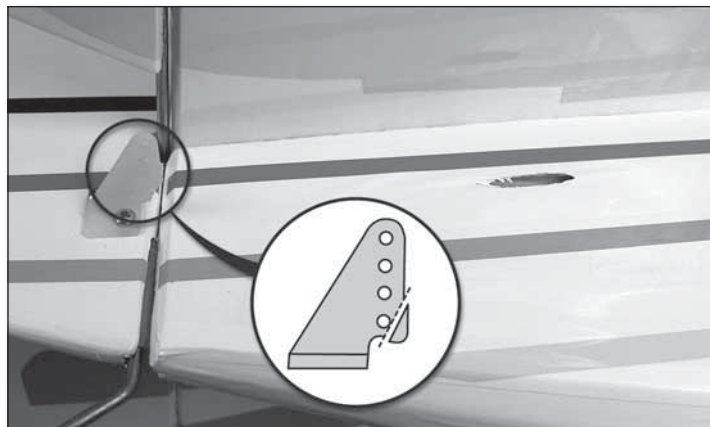
❑ 1. Thread a nylon clevis 20 turns onto two 17-1/2" [445mm] pushrods. Slide a silicone clevis retainer onto each clevis.



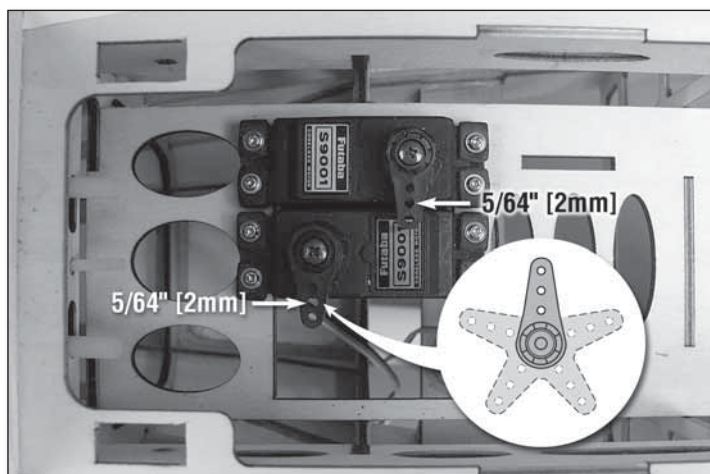
❑ 2. Temporarily insert one of the pushrods into the elevator outer pushrod tube on the left side of the fuselage. Connect the clevis to the outer hole of a **LARGE** control horn.



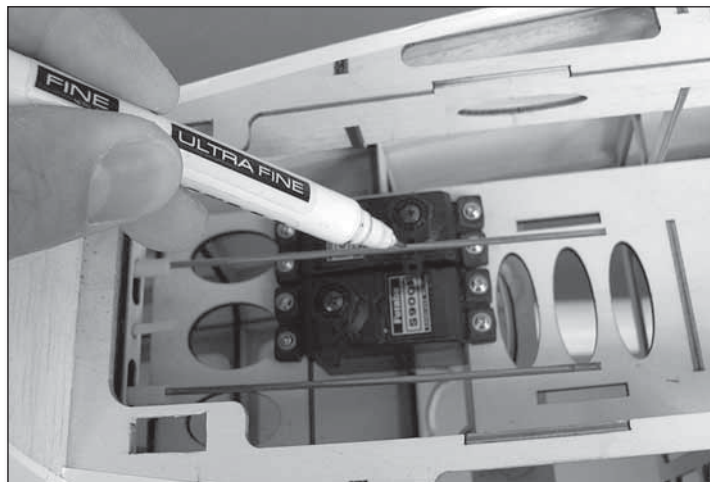
❑ 3. Install the control horn onto the underside of the left elevator half using two 2-56 x 1/2" [13mm] machine screws and a backplate. Be sure to align the holes over the hinge line.



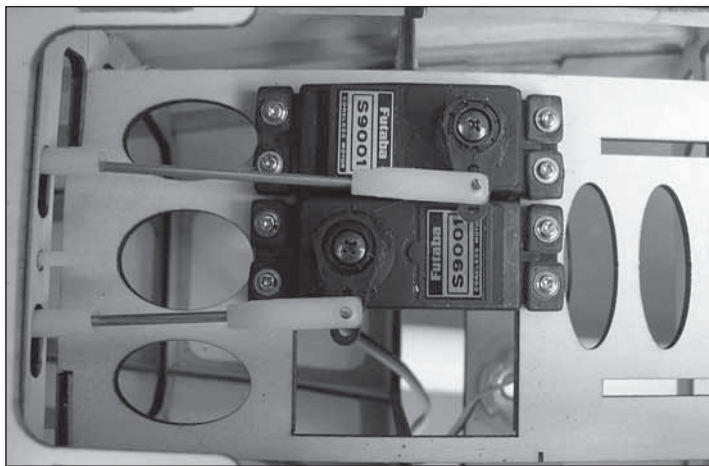
❑ 4. Trim the bottom corner from the rudder control horn. Install the control horn onto the right side of the rudder in the same manner of the elevator using two 2-56 x 1/2" [13mm] machine screws and a backplate. Be sure that the control horn is inline with the rudder pushrod exit slot.



❑ 5. Install the elevator and rudder servos onto the servo tray in the orientation shown. Be sure to harden the servo mount screw holes with CA. Center the servos with the radio system and position the servo horns so they are perpendicular to the servo cases. Trim the remaining four arms from a five arm servo arm and install them onto the servo. Enlarge the **middle** holes of each remaining arm with a 5/64" [2mm] drill bit.

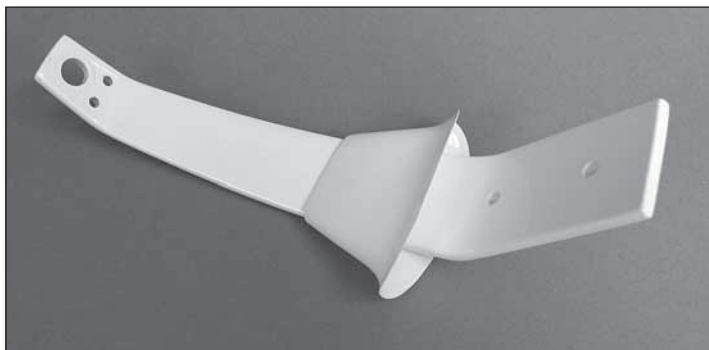


❑ 6. Use tape or small clamps to hold the elevators and rudder in the neutral position. As you did with the ailerons, mark where the pushrods cross the middle holes in the servo arms.

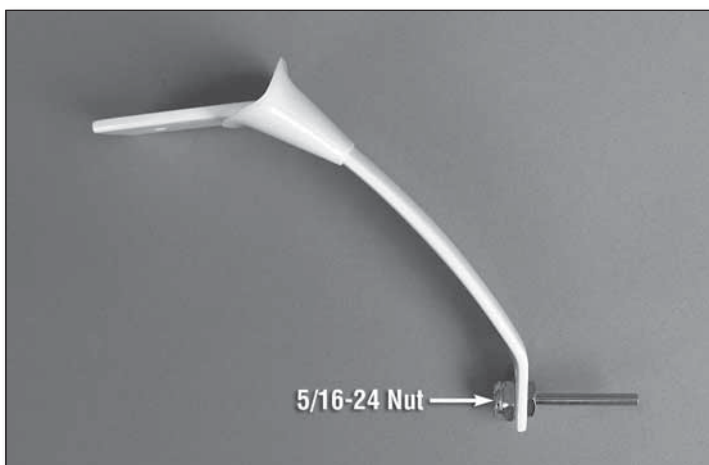


❑ 7. Make a 90° bend at the marks on the pushrods and cut off the excess pushrod 1/4" [6mm] beyond the bends. Attach the pushrods to the servo arms using nylon FasLinks. Thread the clevises up or down on the pushrods as necessary to center the control surfaces with the servo arms centered. When satisfied, slide the silicone clevis retainers to the ends of the clevises to secure them.

ASSEMBLE AND INSTALL THE LANDING GEAR



❑ 1. Slide a landing gear fairing onto each landing gear leg as shown. Hold the gear legs up to the fuselage in position to confirm that you have the fairings on correctly before continuing.

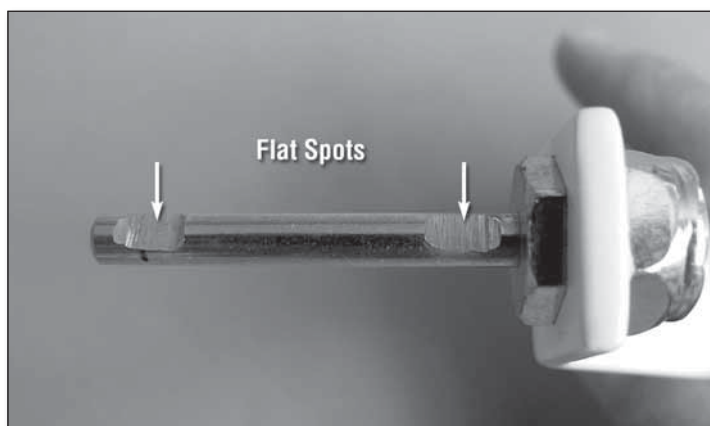


❑ 2. Install a 1-1/4" x 5/32" [32mm x 4mm] axle into each main landing gear leg and tightly secure them using 5/16-24 nuts.



5/32" [4mm] Wheel Collars

❑ 3. Slide a 5/32" [4mm] wheel collar followed by a wheel and then another wheel collar onto each axle. Mark the location of the screw holes in the wheel collars onto the axles.



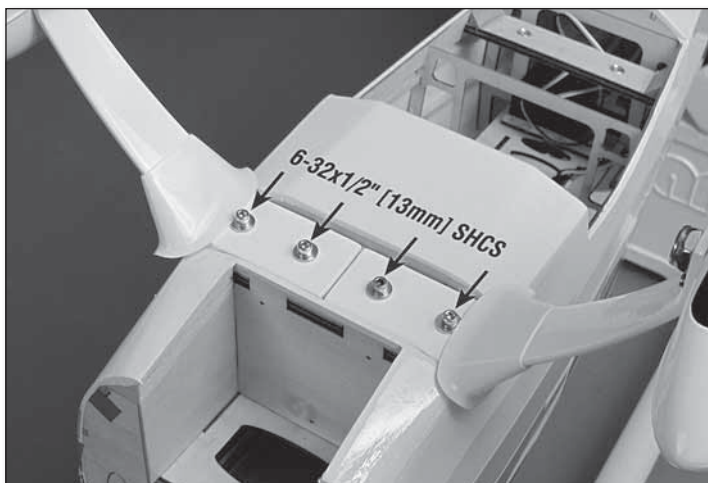
Flat Spots

❑ 4. Remove the wheels and wheel collars from the axles and use a file or rotary tool to grind flat spots at the marks you made.

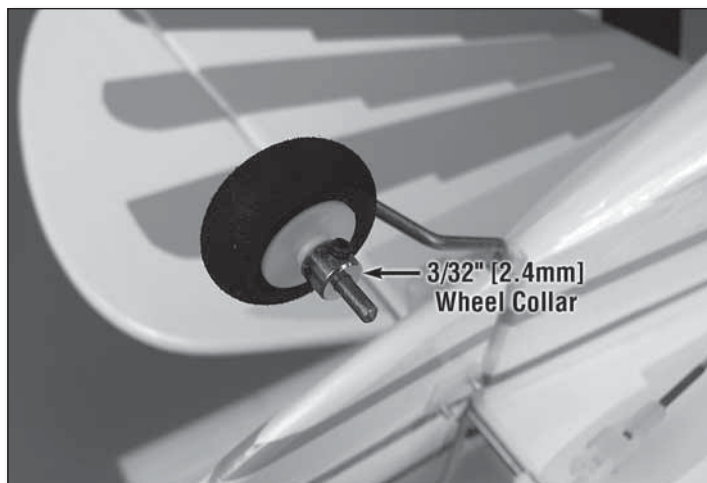
❑ 5. Apply a drop or two of oil to each axle. Reinstall the wheel collars and wheels onto the axles. Thread a 6-32 x 1/4" [6mm] SHCS into each wheel collar with thread locking compound and tighten the screws against the flat spots you made. Be sure that the wheels rotate freely on the axles.



❑ 6. Install the wheel pants onto the landing gear legs with four 2-56 x 3/8" [9.5mm] machine screws, four #2 lock washers and thread locking compound.



❑ 7. Mount the main landing gear to the fuselage using four 6-32 x 1/2" [13mm] SHCS, four #6 flat washers, four #6 lock washers and thread locking compound.



❑ 10. Install the tail wheel onto the tail wheel wire and secure it in place with a 3/32" [2.4mm] wheel collar, 4-40 set screw and threadlocking compound. Be sure that the wheel rotates freely on the wire.

INSTALL THE POWER SYSTEM

Glow Engine Installation

The Christen Eagle is designed to be flown with a .46-.55 two-stroke glow engine, .72 four-stroke glow engine, or a brushless outrunner motor. If you plan to install a brushless motor, skip this section as it only contains information relevant to installing a glow engine.

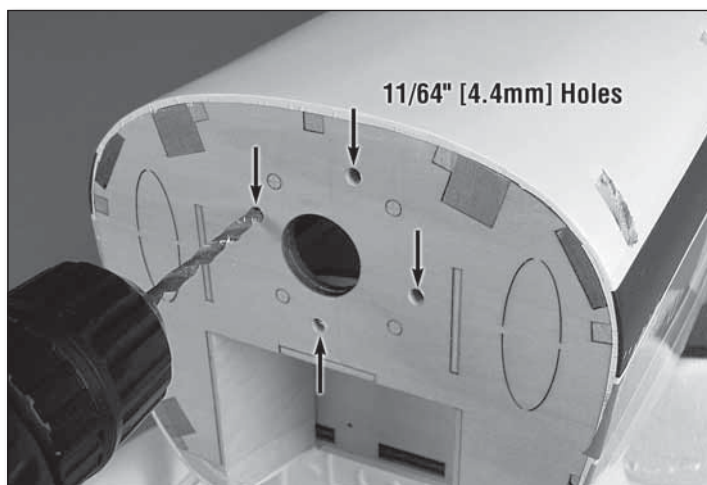
The steps in this section show the installation of the stock engine muffler for a two-stroke engine. If you plan to use a Pitts style muffler, use the other engine mounting holes that are not at an angle. This will allow your engine to be properly side-mounted so the exhaust points downward. Choose the best orientation that matches your muffler and header if installing a four-stroke engine.



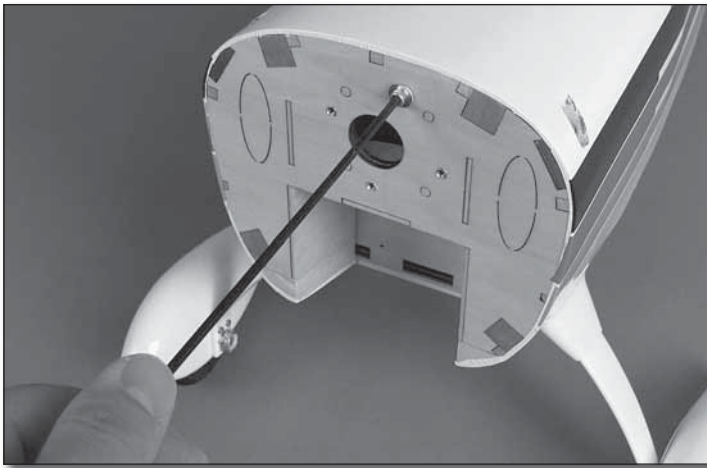
❑ 8. Mark the landing gear fairings where they need to be trimmed to fit around the landing gear screws.



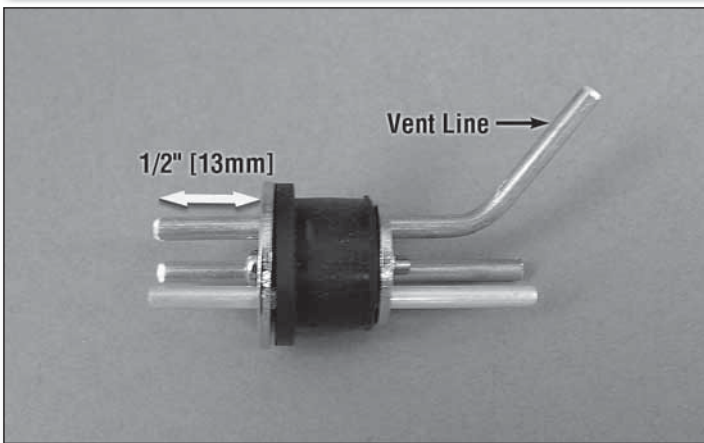
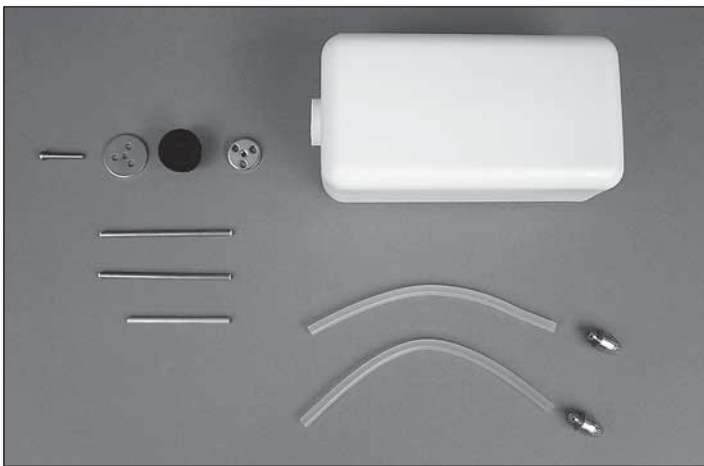
❑ 9. Trim the fairings at the marks you made. Glue the landing gear fairings to the landing gear legs using silicone or RC-56 glue.



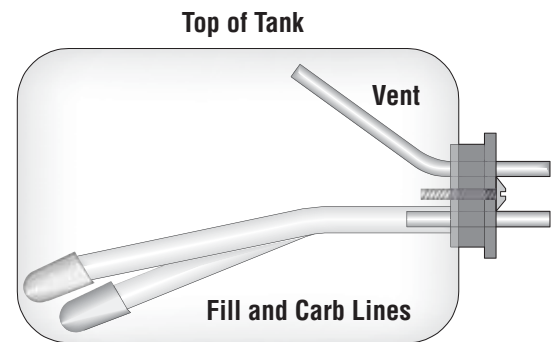
❑ 1. Use an 11/64" [4.4mm] drill bit to drill the four glow engine mounting holes in the firewall. Note that there are eight holes in the firewall. The four hole pattern for the glow engine mount is set at an angle as shown in the picture. The other holes are used for a brushless motor installation.



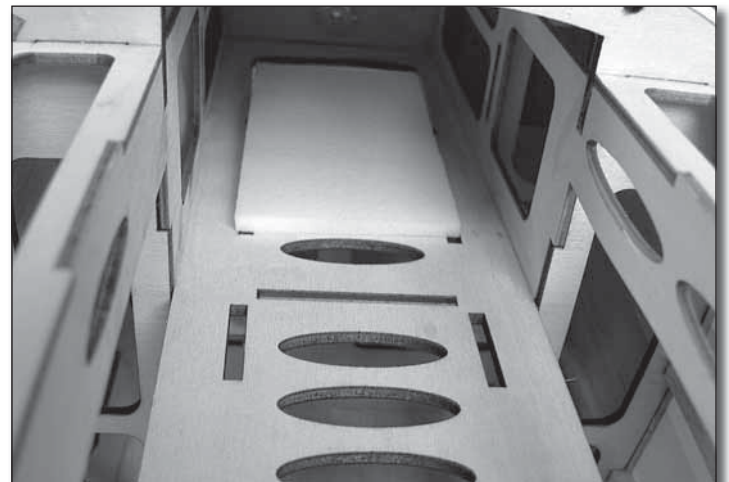
❑ 2. Insert four 6-32 blind nuts into the back of the firewall. Use a 6-32 x 3/4" [19mm] SHCS and a #6 flat washer to draw the blind nuts tight into the firewall.



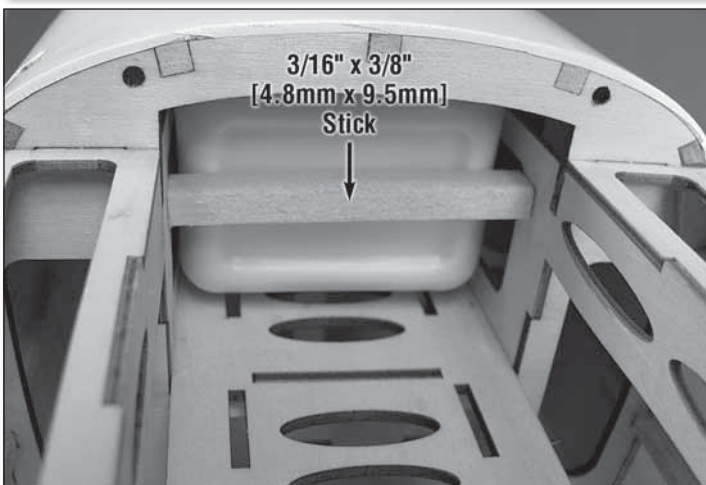
❑ 3. The fuel tank can be assembled as a two line system consisting of a vent (pressure) line to the muffler and a carb line. Filling and emptying of the tank would need to be done through the carb line, or an optional fuel fill valve (not included). The tank can also be assembled as a three line system having a vent line, carb line, and fill line. If installing a fill line, puncture the top of the stopper above the sealed off fuel tube hole. The fill and carb lines should extend out 1/2" [13mm] beyond the stopper and the vent line should be bent upwards and left uncut. With the tubes installed in the stopper, fit the stopper plates loosely in place with the 3 x 25mm phillips screw to hold the assembly together.



❑ 4. Fit the stopper assembly into the tank with the vent line pointing toward the top of the tank, but not touching. The fuel tubing and clunks (fuel pickup) on the carb and fill lines should almost reach the back of the tank but not touch. The clunks must be able to move freely inside the tank when assembled. Adjust the length of the fuel tubing accordingly. When satisfied, tighten the 3x25mm screw in the stopper to secure it in place (do not over-tighten). Mark the side of the tank that must face up when installed in the plane. We also suggest marking the tubes in the stopper.



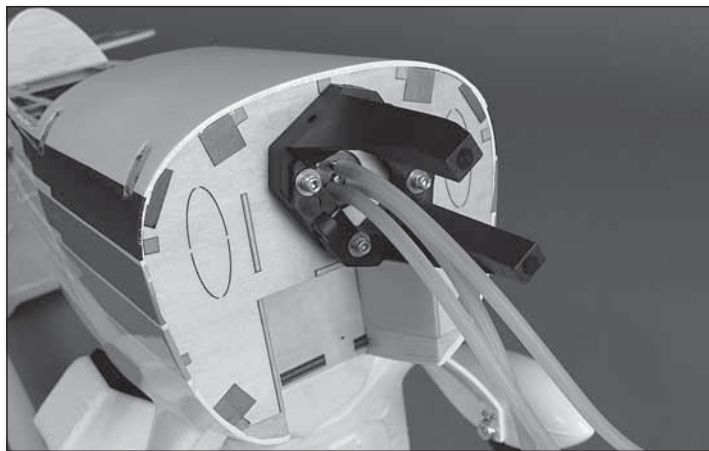
❑ 5. Cut a piece of 1/4" [6mm] thick foam rubber (not included) to fit the fuel tank and place it on the fuel tank tray. You may find it easier to insert the tank if you glue the foam to the tray.



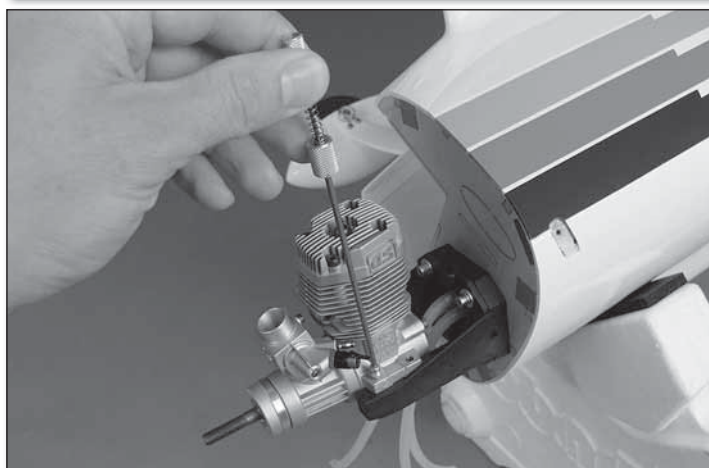
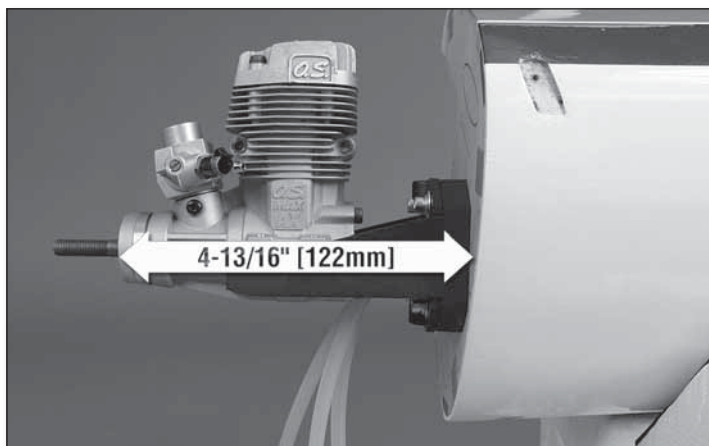
❑ 6. Insert the tank into the fuselage so the tank neck passes through the hole in the firewall. Cut a piece from the included 3/16" x 3/8" [4.8mm x 9.5mm] balsa stick to fit snugly between the plywood framework behind the fuel tank. Securely glue the stick in place.



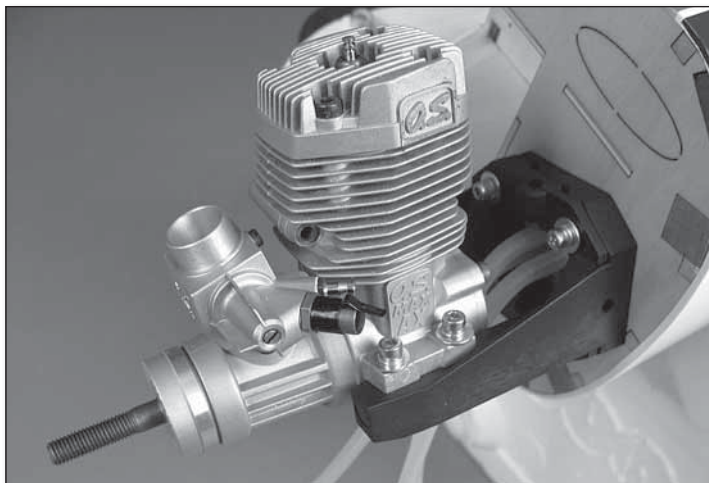
❑ 7. Connect a 6-7" [152-178mm] piece of standard fuel tubing to each tube protruding from the fuel tank.



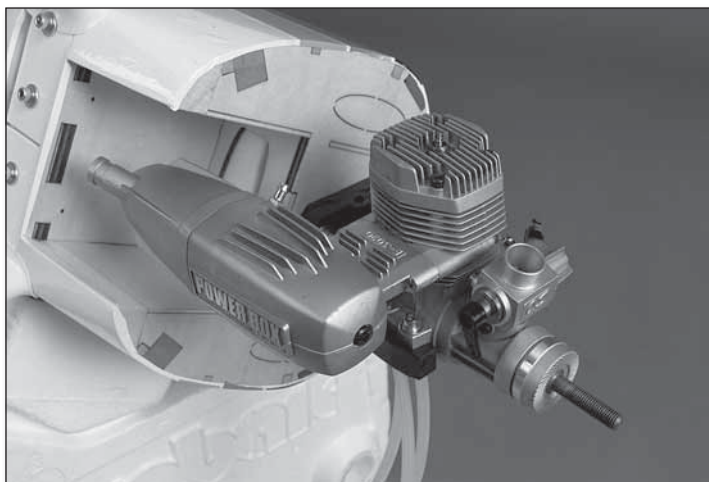
❑ 8. Install the engine mount to the firewall using four 6-32 x 3/4" [19mm] SHCS, four #6 flat washers, four #6 lock washers and thread locking compound. Leave the screws slightly loose. Test fit your engine between the mount halves. Slide the mount halves against the sides of the engine and finish tightening the mount screws.



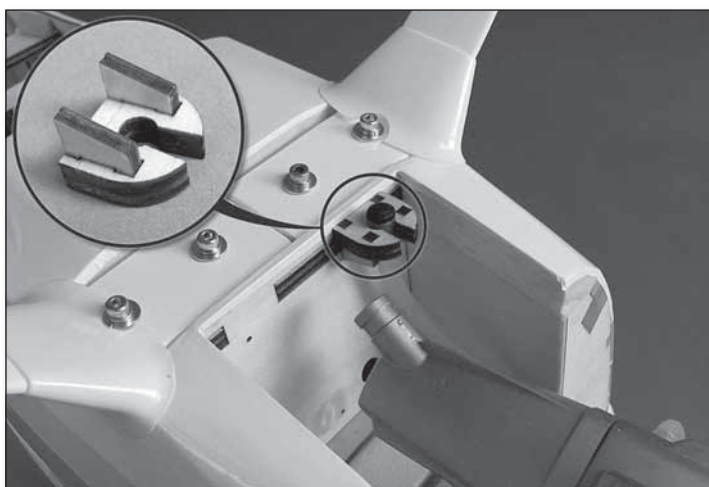
❑ 9. Position the front of the engine drive washer 4-13/16" [122mm] from the front of the firewall. Mark the location of the engine mount holes onto the mount rails using a Dead Center Hole Locator. Remove the engine from the mount and use a 6-32 tap and drill set to create threads in the four mounting holes. **Note:** If you are installing a 4-stroke engine, you may need to trim away the nose gear bearing from the engine mount to provide clearance for the carburetor. An in-cowl exhaust header (OSMG2567) will be useful in routing a 4-stroke muffler in the preferred position.



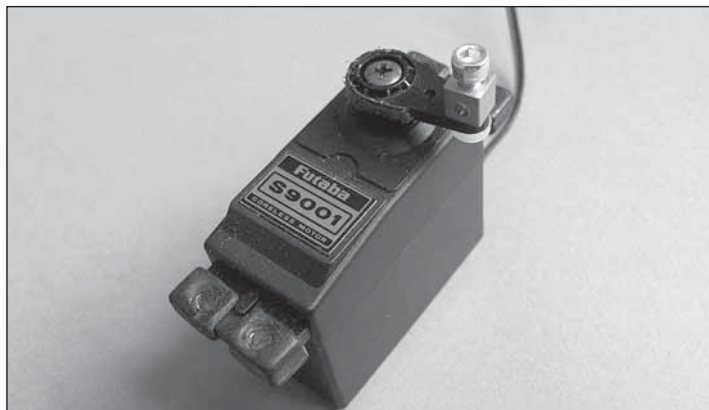
- ❑ 10. Attach the engine to the mount using four 6-32 x 3/4" [19mm] screws, four #6 flat washers and four #6 lock washers.



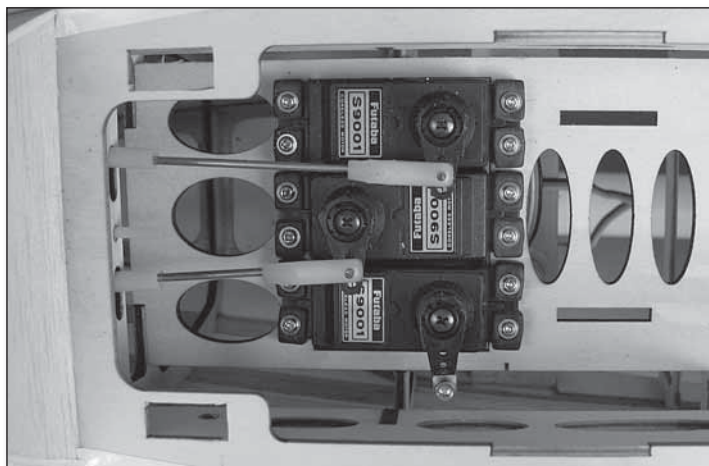
- ❑ 11. Install your muffler onto the engine.



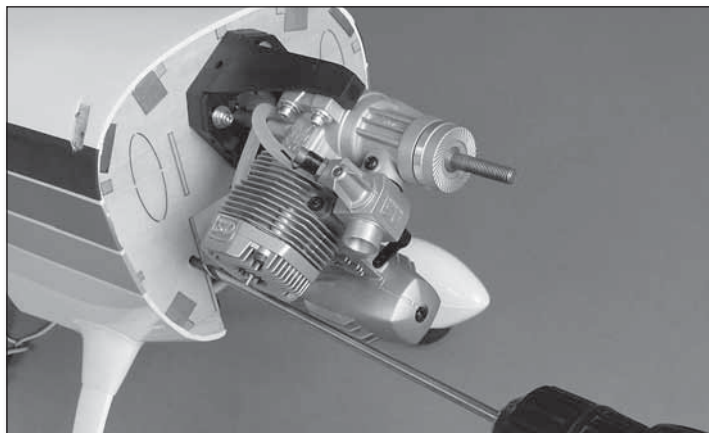
- ❑ 12. Cut the fuel tubing coming from the tank to the proper length and connect the pressure and carb lines to the engine. The fill line (if installed) should be plugged with the included fuel line plug. A plywood fill line clip is included and is glued together as shown. Be sure to fuel proof the clip with epoxy or CA glue. Securely glue the clip in the location shown and route the fill line through the clip.



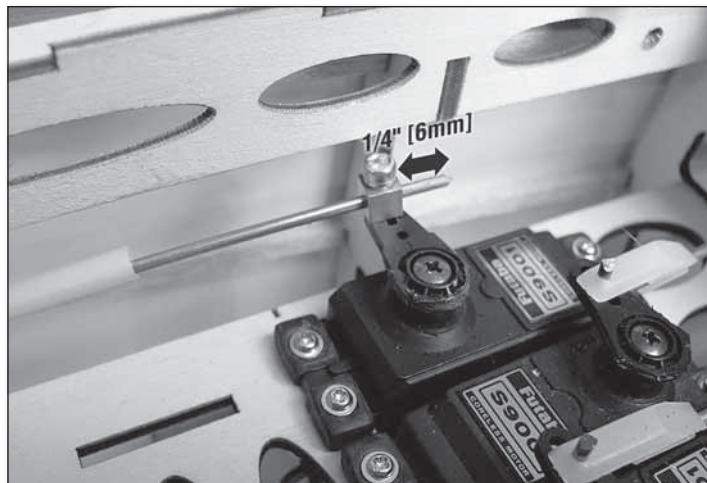
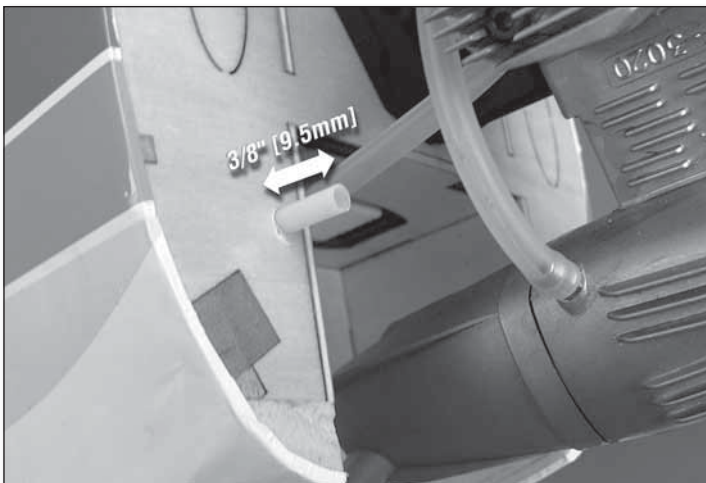
- ❑ 13. Cut four arms from a five-armed servo arm included with your throttle servo. Center the servo with your radio system (throttle stick positioned at 50% throttle) and install the arm perpendicular to the servo case. Install a screw-lock pushrod connector into the outer hole in the remaining arm and secure it in place with a nylon screw-lock connector retainer. Loosely install a 4-40 x 1/4" SHCS set screw into the screw-lock pushrod connector.



- ❑ 14. Install the throttle servo onto the servo tray using the hardware supplied with the servo.

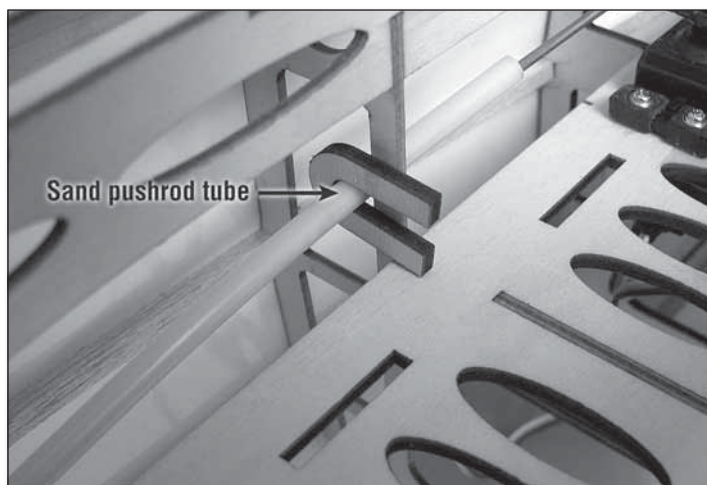


- ❑ 15. Drill a 3/16" [4.8mm] hole for the throttle pushrod in the firewall and the second former inline with the throttle arm on the carburetor. An extra long drill bit is very useful for this step (drill bit shown is stock number HIGR1020). Be sure that you do not drill into the fuel tank if the throttle arm on your engine is located in a different position than the one shown in the picture.

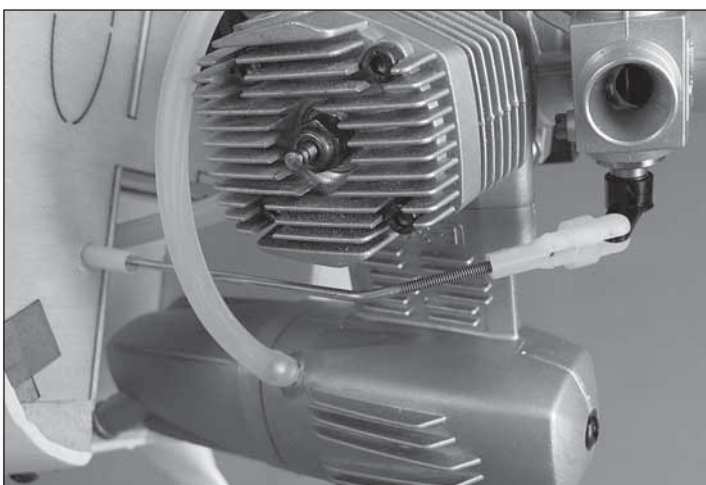


❑ 16. Insert the 12" [305mm] outer pushrod tube through the firewall and former but do not glue it yet. The front of the pushrod tube should protrude approximately 3/8" [9.5mm] beyond the front of the firewall.

❑ 18. The aft end of the pushrod should pass through the screw-lock connector. Adjust the pushrod position in the connector so that the throttle servo properly opens and closes the carburetor. When satisfied, tighten the SHCS in the connector against the pushrod and cut off the excess pushrod 1/4" [6mm] behind the connector. Use the radio system to test the operation of the throttle.



❑ 19. Sand the outer pushrod tube in the location of the pushrod clip and the forward end. Use the plywood pushrod clip to secure the outer pushrod tube to one of the fuselage formers. Thoroughly glue the clip in place. Apply some CA glue where the outer pushrod tube passes through the firewall.

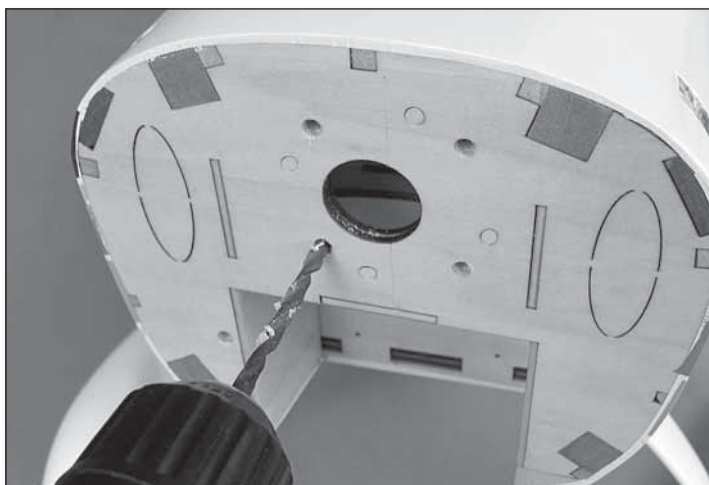


❑ 17. Thread a nylon clevis with silicone clevis retainer onto the 36" pushrod. Insert the pushrod into the outer pushrod tube. Make any necessary bends on the pushrod so that the clevis can connect to the throttle arm without binding.

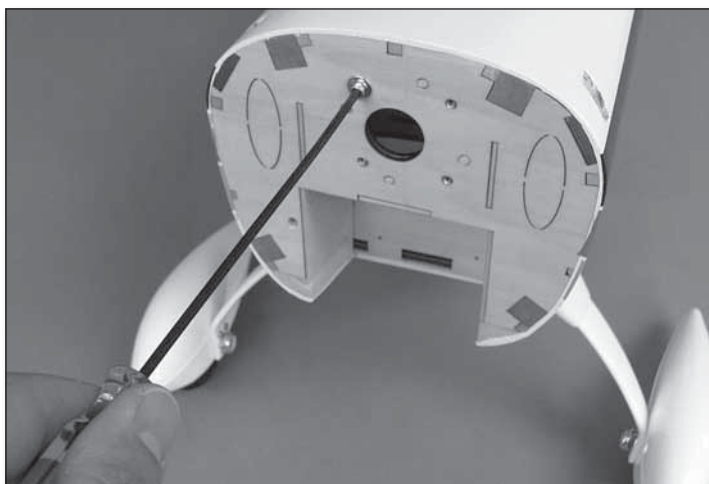
Brushless Motor Installation

The Christen Eagle is designed to be flown with a .46-.55 two-stroke glow engine, .72 four-stroke glow engine, or a brushless outrunner motor. If you have installed a glow engine, skip this section as it only contains information relevant to installing a brushless motor.

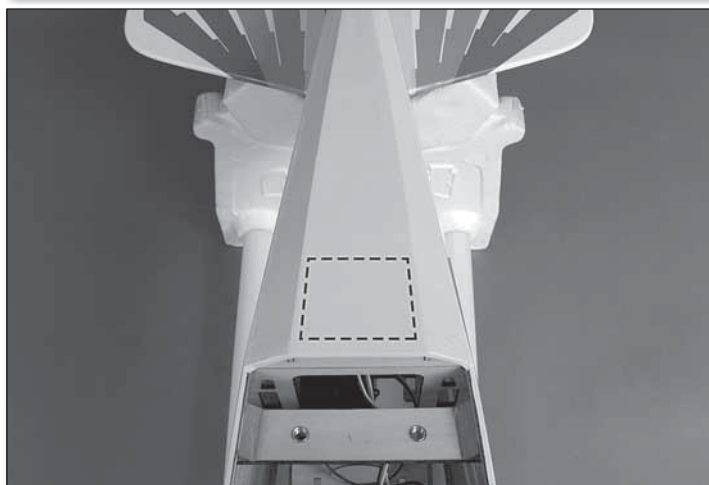
Be sure to read and understand the instructions that come with the ESC and motor before attempting to operate the system.



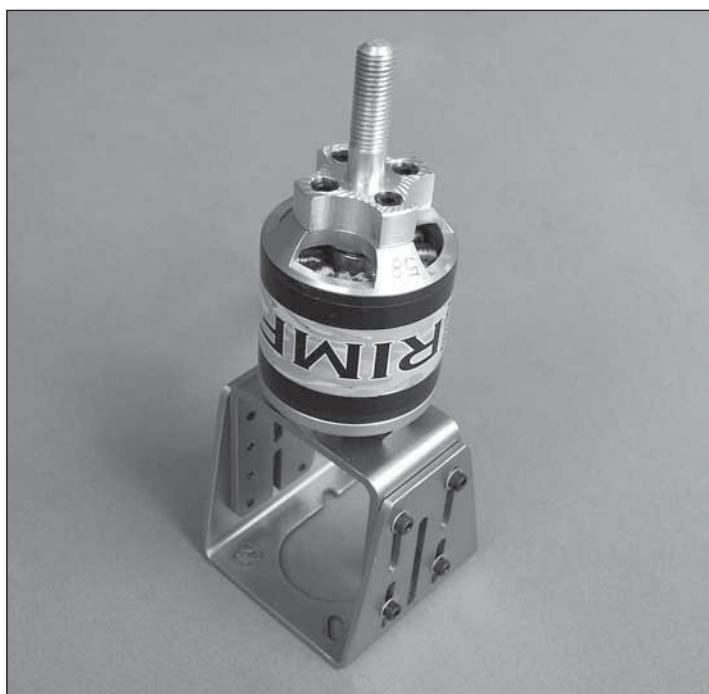
❑ 1. Use an 1/16" [4.4mm] drill bit to drill the four brushless motor mounting holes in the firewall. Note that there are eight holes in the firewall. The four hole pattern for the brushless motor mount is positioned as shown in the picture. The other holes are used for a glow engine installation.



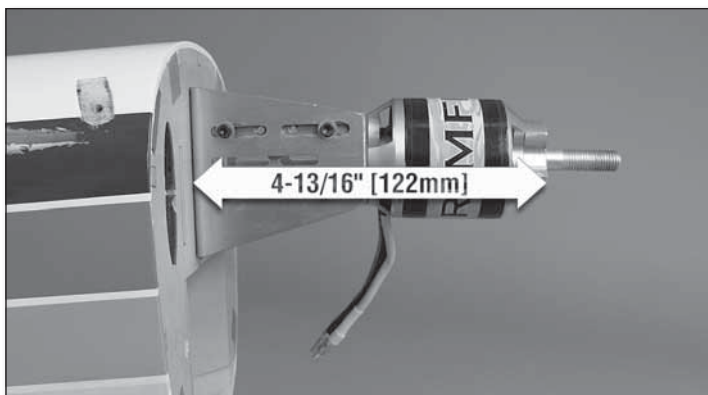
❑ 2. Insert four 6-32 blind nuts into the back of the firewall. Use a 6-32 x 1/2" [13mm] SHCS and a #6 flat washer to draw the blind nuts tight into the firewall.



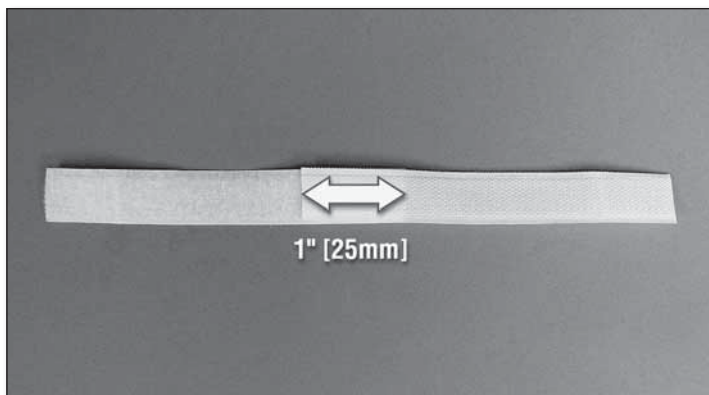
❑ 3. Open up the perforated cool air holes in the firewall. Trim the covering from the air exit hole in the bottom of the fuselage behind the wing saddle.



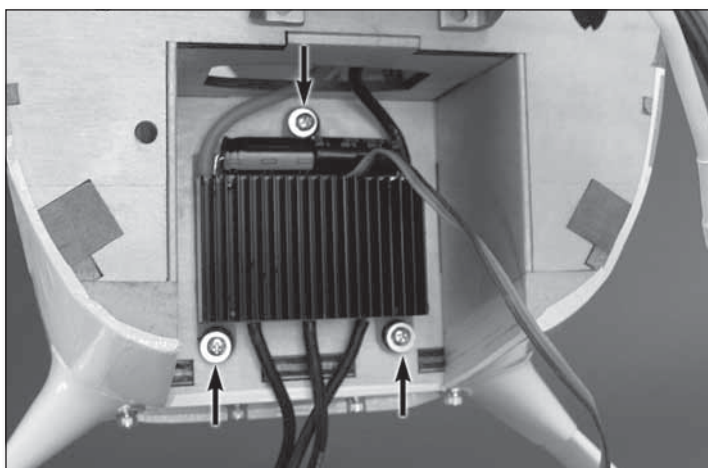
❑ 4. Use the included four 3x8mm machine screws and thread locking compound to attach the brushless motor to the motor mount (not included).



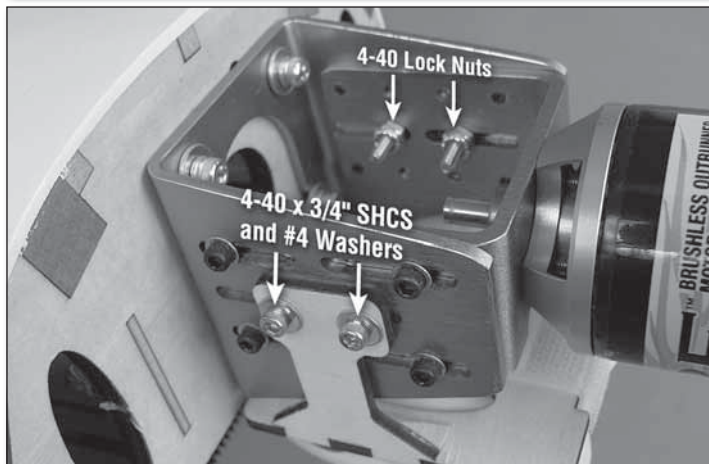
❑ 5. Attach the motor mount to the firewall using four 6-32 x 1/2" [13mm] SHCS, four #6 flat washers, four #6 lock washers and thread locking compound. Loosen the screws that hold the two motor mount halves together. Set the distance between the firewall and the front of the prop adapter to be 4-13/16" [122mm]. Retighten the screws with thread locking compound. Take care not to inadvertently add any up or down thrust when altering the length of the motor mount.



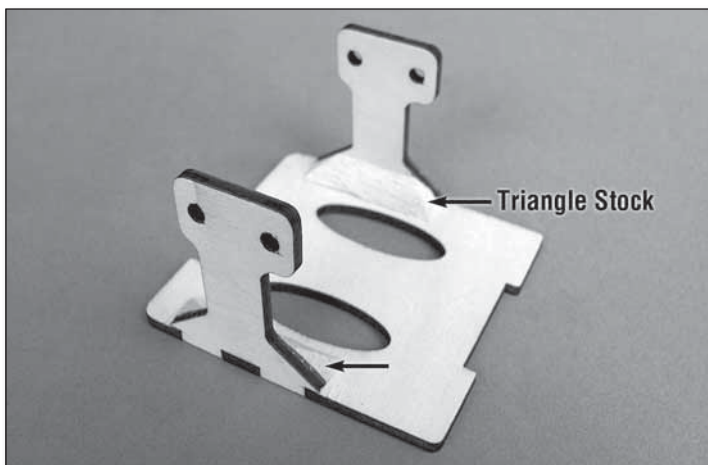
❑ 8. Make a strap from the included hook and loop material long enough to wrap around your receiver battery by overlapping the mating ends approximately 1" [25mm].



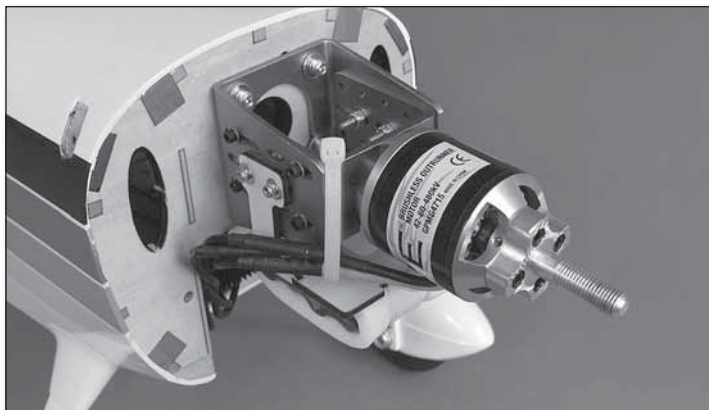
❑ 6. Enlarge the three mounting holes for the ESC using a 5/64" [2mm] drill bit. Thread a #4 x 1/2" [13mm] screw into each hole and back it out. Apply a drop of thin CA glue to each hole. When the glue is dry, mount the ESC as shown using three #4 x 1/2" [13mm] self-tapping screws and three #4 flat washers.



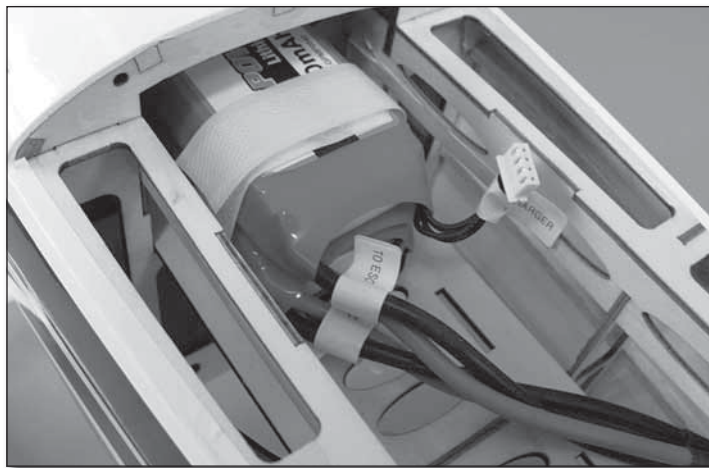
❑ 9. Wrap your receiver pack with foam rubber (not included) and secure it to the battery tray using the strap you made in the previous step. Use four 4-40 x 3/4" [19mm] SHCS, four #4 flat washers and four 4-40 nylon locknuts to bolt the battery tray to the brushless motor mount as shown.



❑ 7. Assemble the receiver battery tray as shown. Use pieces of the included triangle stock to reinforce the glue joints.



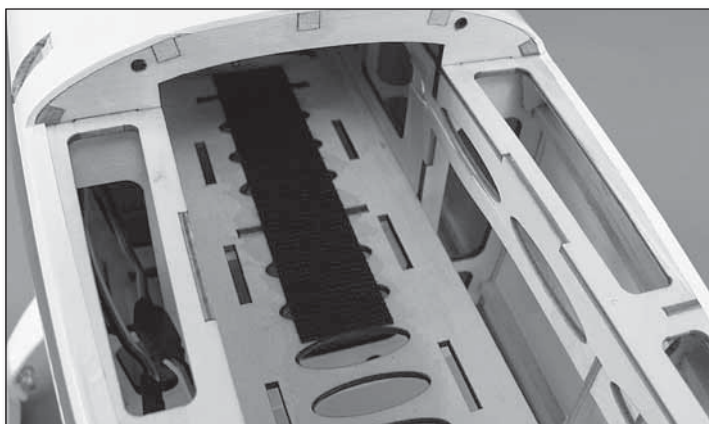
□ 10. Attach a 6" [152mm] servo extension to the receiver battery using a piece of heat shrink tubing to secure the connection. Connect the ESC to the motor and route the receiver and battery wires through the firewall toward the servos. Now would be a good time to test the operation of the motor using your radio system. The motor should rotate counter-clockwise when looking at it from the front. If it rotates the wrong direction simply swap two of the three motor leads. Use a tie strap (not included) or tape to secure the motor lead wires to the motor mounting box.



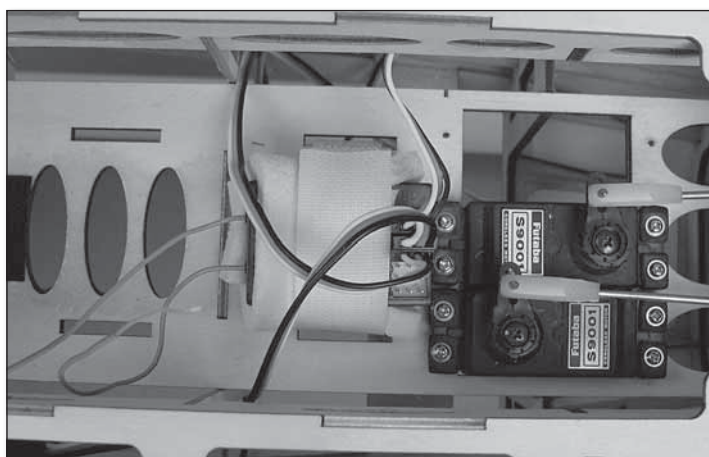
□ 13. Test fit your batteries onto the tray. Adjust the length of the strap if necessary. When you check the balance of the plane, the exact position of the batteries on the tray will be determined.

FINISH THE MODEL

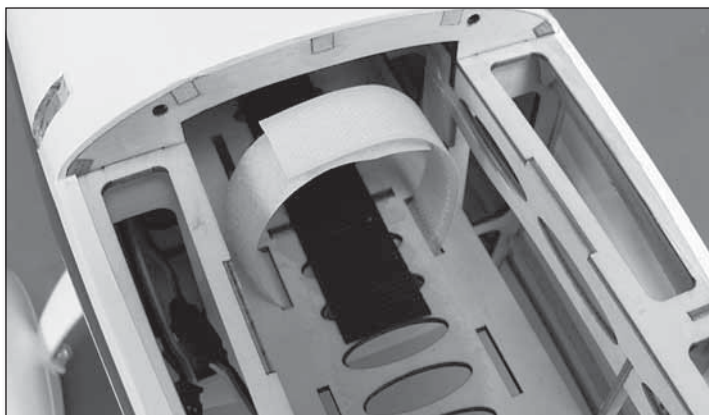
Install the Receiver and Battery



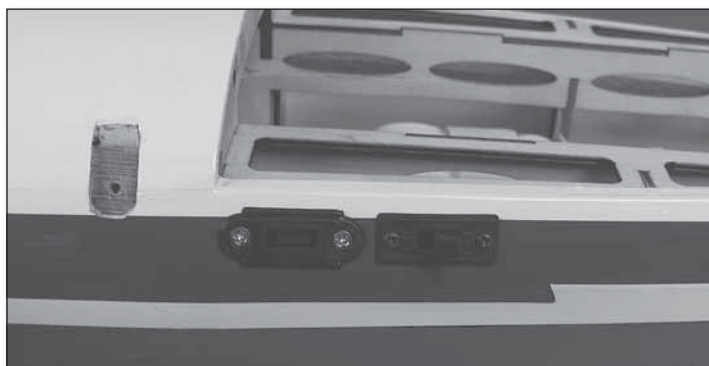
□ 11. Apply a thin coat of epoxy down the center of the battery tray. This will improve the adhesion of the hook and loop material. When the epoxy has completely cured, attach a piece of the hook side from some self-adhesive hook and loop material (not included) to the battery tray. The loop side should be attached to your battery pack (use additional pieces to join LiPo packs together for a series configuration).



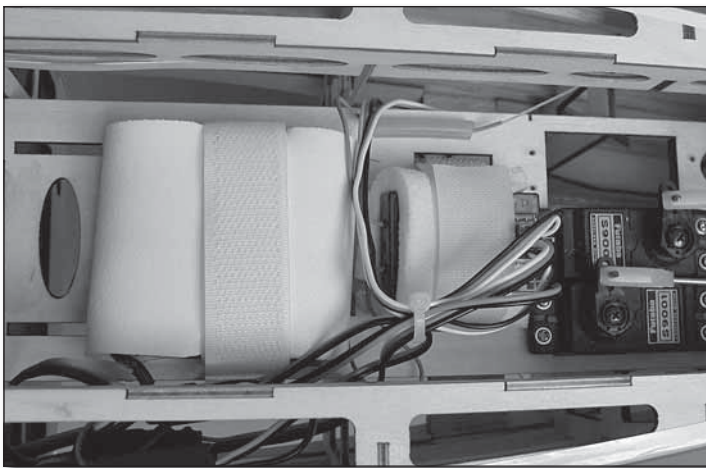
□ 1. Make a strap from the included hook and loop material to fit your receiver. Cut a piece of foam rubber (not included) to fit your receiver and strap the receiver to the radio tray as shown. Connect the rudder, elevator and throttle servos to the receiver (or ESC if applicable).



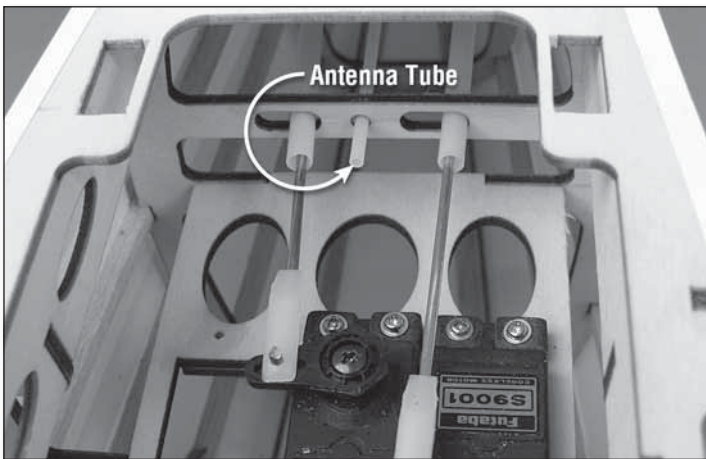
□ 12. Make a hook and loop strap approximately 10" [254mm] long and feed the strap through the slots in the battery tray.



□ 2. Mount your switch harness and charge jack to the fuselage side in the location that you prefer.

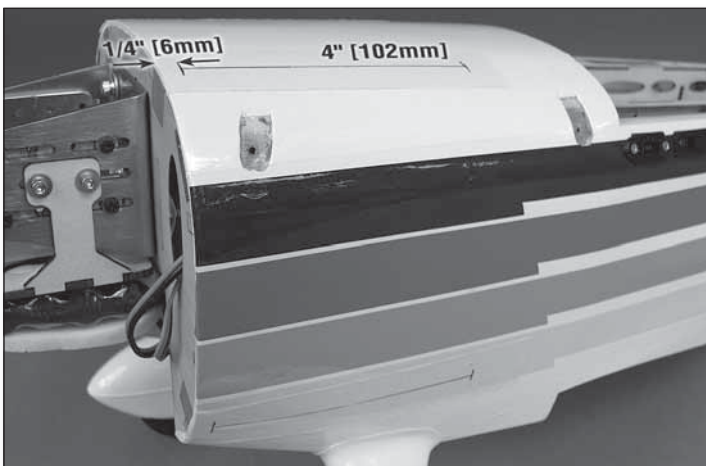


❑ 3. If you have installed a glow engine, strap the receiver pack to the tray in front of the receiver. Pieces of scrap fuel tubing have been glued to the tray to align the dual 2.4GHz receiver antennas in the orientation described in the radio manual.

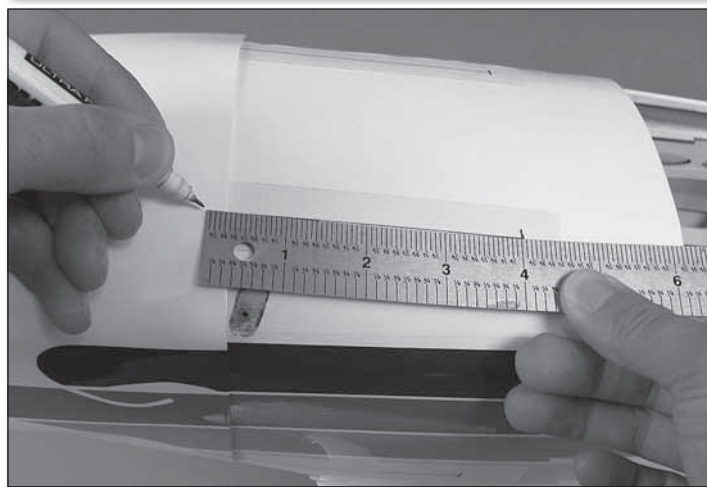
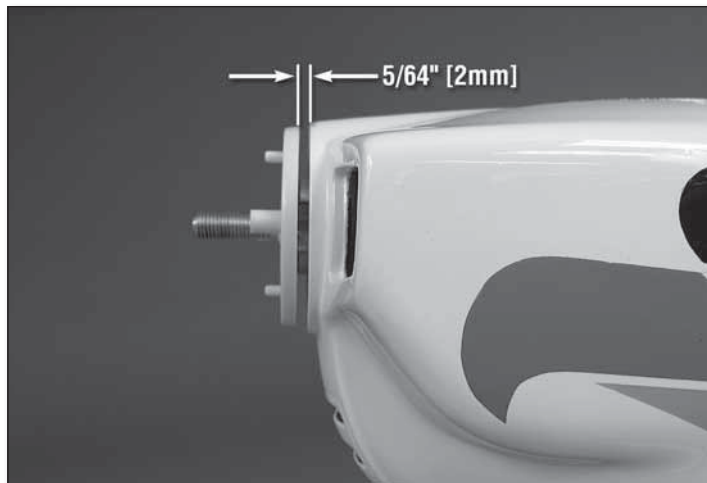


❑ 4. A receiver antenna tube is provided if you are using an FM receiver.

Install the Cowl and Spinner

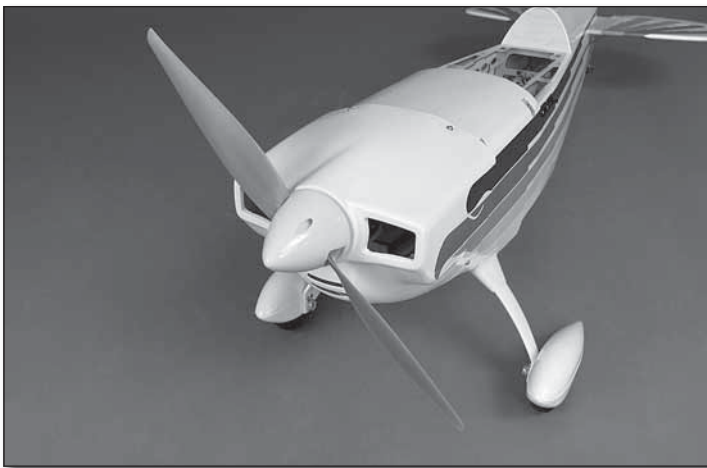


❑ 1. Apply 5" [127mm] pieces of tape along the fuselage starting at each of the four cowl mounting blocks. Mark the center of each block onto the tape (1/4" [6mm] from the edge of the firewall) and draw 4" [102mm] lines from your marks.

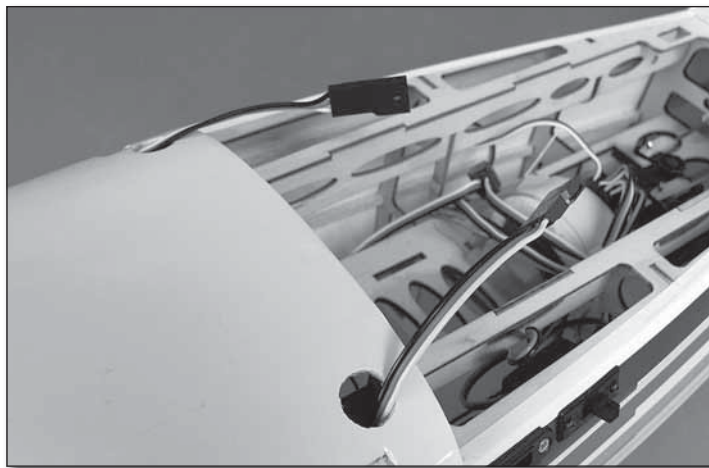


❑ 2. If necessary, enlarge the hole in the spinner backplate to match your crankshaft or prop adapter. Place the cowl onto the fuselage and then the spinner backplate onto the motor. Position the cowl 5/64" [2mm] behind the spinner backplate, center the front of the cowl with the backplate, align the colors on the cowl with the trim scheme on the fuselage and tape the cowl in position or have a helper hold it in place. Measure along the lines on the tape 4" [76mm] and mark the cowl for the four mounting screws. Drill 1/16" [1.6mm] holes through the cowl and into the cowl mounting blocks at your marks. Remove the cowl from the fuselage and enlarge the holes in the cowl to 3/32" [2.4mm]. Thread a #2 x 3/8" [9.5mm] self-tapping screw into each cowl mounting hole in the fuselage and back it out again. Apply a drop of thin CA to each hole. Mount the cowl using four #2 x 3/8" [9.5mm] self-tapping screws and four #2 flat washers.

❑ 3. If you have installed a glow engine, cut openings in the cowl for the needle valve, glow plug access, muffler clearance, etc.

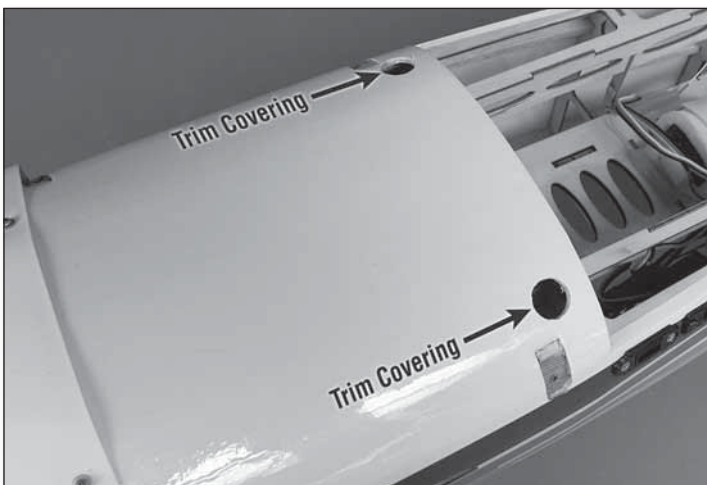


❑ 4. Install the propeller, prop washer, prop nut, and spinner cone. It may be necessary to enlarge the propeller slots in the spinner cone to fit over your prop.

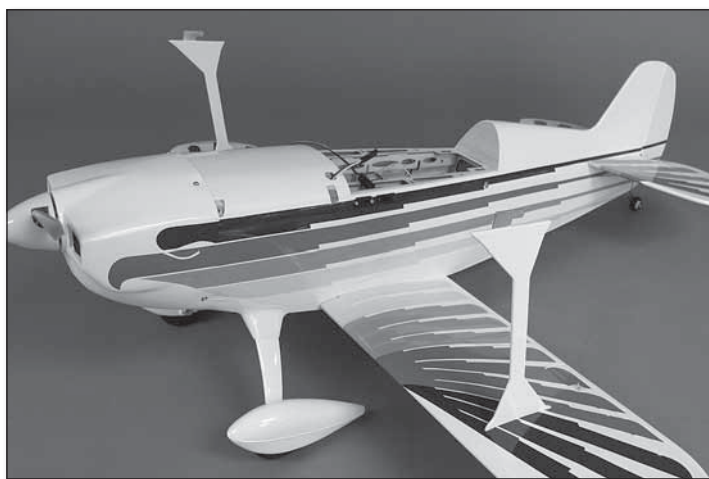


❑ 3. Route 12" [305mm] servo leads through the holes that you trimmed the covering from (if applicable) and connect the leads to your receiver with a Y-harness.

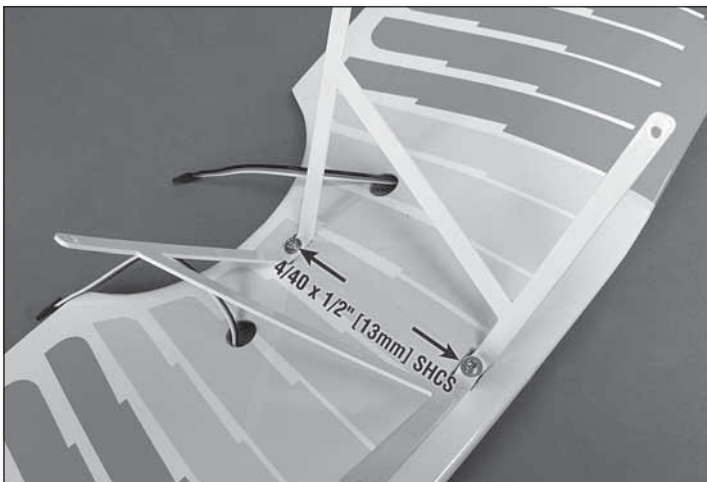
Install the Wings and Struts



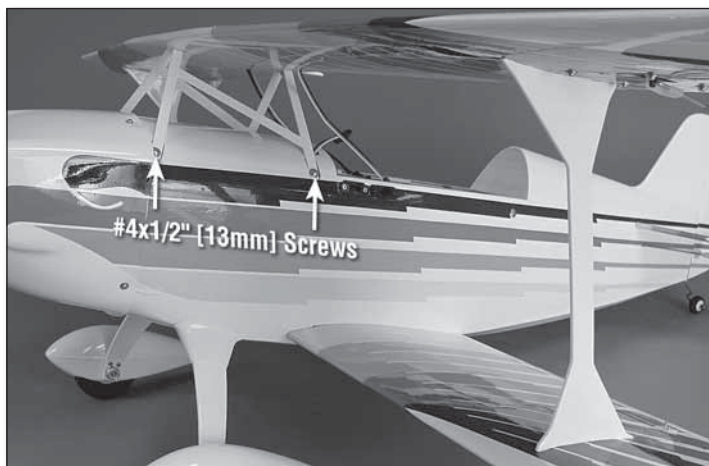
❑ 1. If you have installed aileron servos in the top wing, trim the covering from the holes in the sheeting just aft of the rear cabane strut mounting points.



❑ 4. Bolt the bottom wing to the fuselage. Attach the interplane struts to the bottom wing by inserting the aluminum tabs into the slots. Slide the struts aft until they are fully seated in the wing. The strut ends that have a more curved end attach to the bottom wing.



❑ 2. Attach the cabane struts to the top wing as shown with two 4-40 x 1/2" [13mm] SHCS, two #4 flat washers and thread locking compound.

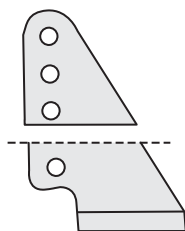


❑ 5. Fit the top wing onto the interplane struts and secure them into the slots the same way you did with the bottom wing. Slide the bottom ends of the cabane struts into the grooves in the fuselage. Attach the cabanes to the fuselage using four #4 x 1/2" [13mm] screws and four #4 flat washers.

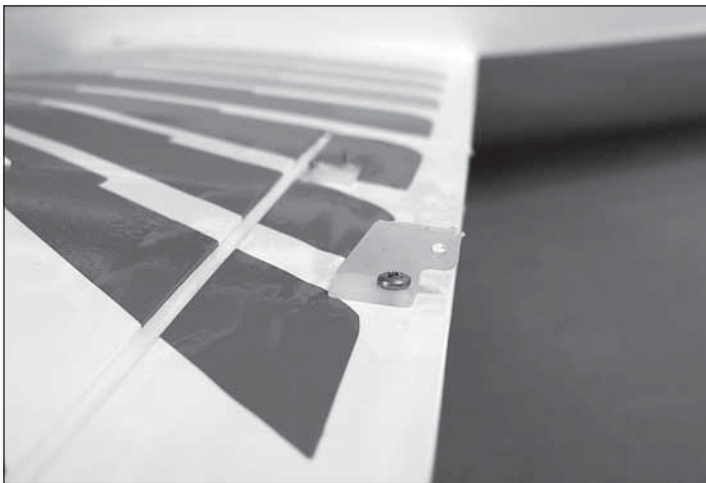


❑ 6. Connect the top aileron servo lead extensions (if applicable) and then tape the connectors to the insides of the cabanes. Be sure that you can easily connect and disconnect the top wing.

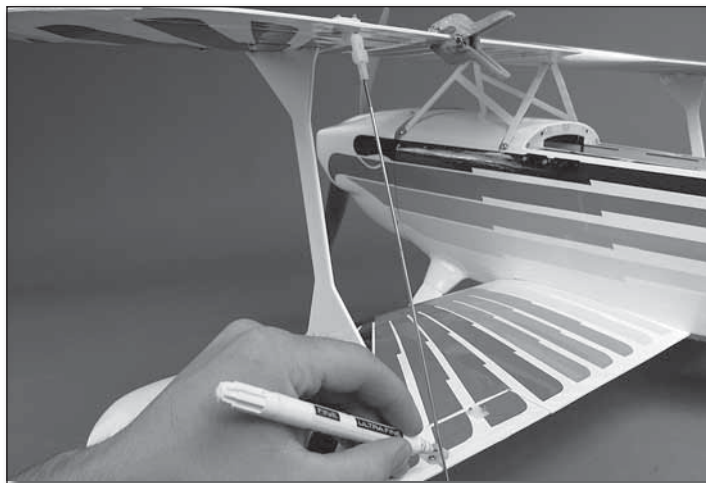
Steps 7-10 should only be completed if you did not install servos in the top wing. If you did install servos in the top wing, skip to step 11.



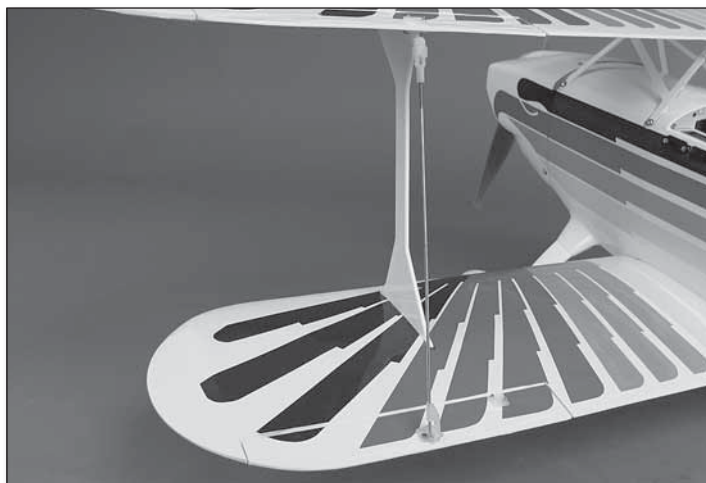
❑ 7. If you did not install aileron servos into the top wing, cut off the top three holes from four small control horns. Enlarge the remaining holes from only **two** of the control horns that you just cut with a 5/64" [2mm] drill bit.



❑ 8. Locate the hardwood mounting points in the ailerons in line with the trailing edge. Attach the control horns with the 5/64" [2mm] holes onto the bottom ailerons using four 2-56 x 3/8" [9.5mm] machine screws and backplates. Attach the other two control horns to the upper ailerons in the same manner.

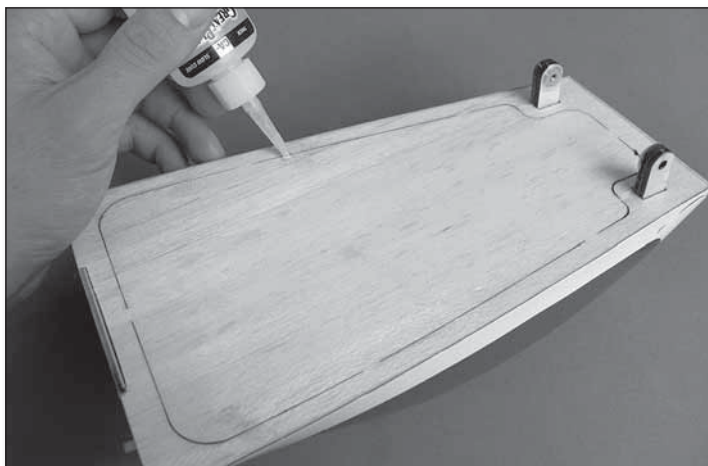


❑ 9. Thread a nylon clevis 20 turns onto each of the remaining 12" [305mm] pushrods. Fit a silicone clevis retainer onto each clevis. Attach the clevises to the control horns on the upper ailerons. Use small clamps or tape to hold the upper and lower ailerons in the neutral position and mark where the pushrods cross the holes in the bottom aileron control horns.



❑ 10. Make a 90° bend at both marks you made on the pushrods. Cut off the excess pushrods 1/4" [6mm] beyond the bends. Attach the pushrods to the bottom control horns with nylon FasLinks.

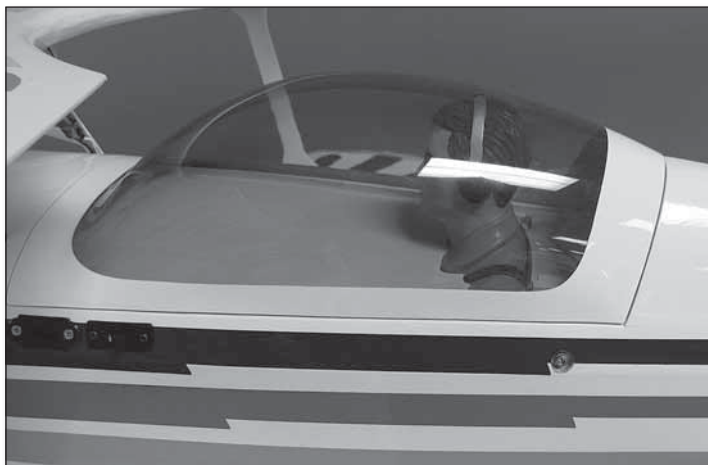
Install the Canopy/Hatch



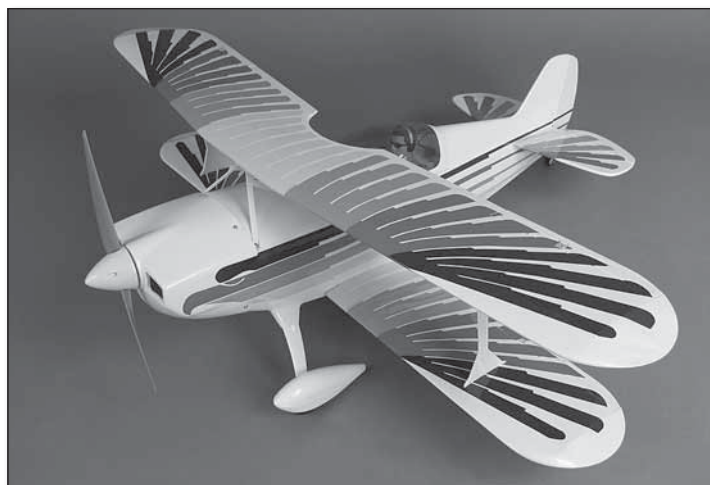
❑ 11. The base of the canopy hatch has a partial laser cut line that is cut through the majority of the perimeter of the hatch. If you wish to remove the base of the hatch to install additional cockpit details of your choice, use a sharp hobby knife to finish the cut lines. If you choose to not remove the base, apply a bead of medium or thick CA glue around the cut lines and allow it to harden.



❑ 12. We recommend gluing a #4 flat washer to each of the two 4-40 x 3/4" [19mm] SHCS for the canopy hatch. This will reduce the chance of losing the washers at the flying field.



❑ 13. Fit the canopy hatch in place and secure it with the two 4-40 x 3/4" [19mm] SHCS you prepared in the previous step.



❑ 14. This completes the assembly of the Christen Eagle .46 ARF!

Apply the Decals

1. Be certain the model is clean and free from oily fingerprints and dust. Prepare a dishpan or small bucket with a mixture of liquid dish soap and warm water—about one teaspoon of soap per gallon of water. Submerge the decal in the soap and water and peel off the paper backing. **Note:** Even though the decals have a “sticky-back” and are not the water transfer type, submersing them in soap & water allows accurate positioning and reduces air bubbles underneath.

2. Position decal on the model where desired. Holding the decal down, use a paper towel to wipe most of the water away.

3. Use a piece of soft balsa or something similar to squeegee remaining water from under the decal. Apply the rest of the decals the same way.

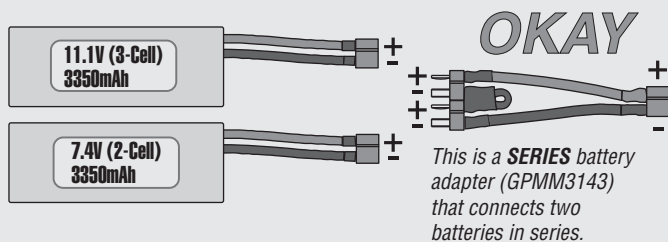
GET THE MODEL READY TO FLY

Install and Operate the Motor Battery (Brushless Only)

IMPORTANT: If using multiple battery packs that are connected with an adapter, never charge the batteries together through the adapter. Always charge each battery pack separately. Charge the batteries, then read the following precautions on how to connect multiple packs for flying the model.

There are two ways to connect multiple battery packs: In **Series** and in **Parallel**.

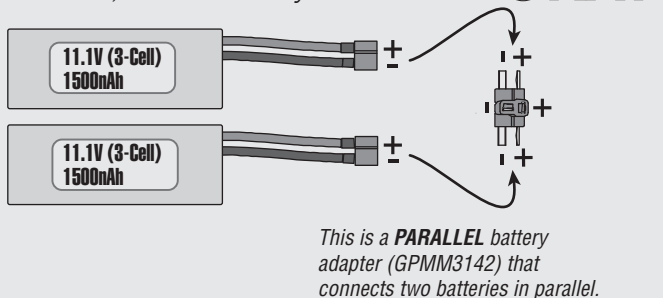
*These are two 3350mAh batteries (one 11.1V and the other 7.4V). When joined in **SERIES**, the result will be a 18.5V, 3350 mAh battery.*



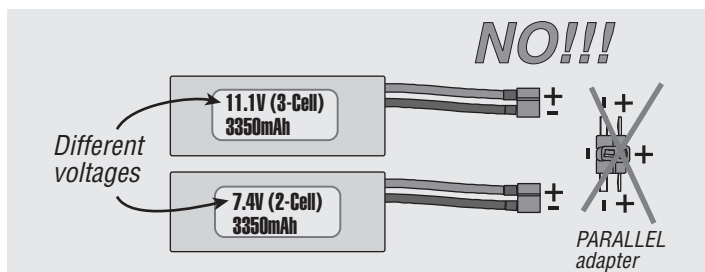
It's okay to connect batteries with different voltages in series to achieve the new, desired voltage.

1. Connecting batteries in “**Series**” means to connect the (+)'s to the (-)'s and the (-)'s to the (+)'s. This combines the voltages of the batteries, but the capacity remains the same.

*These two 1500mAh batteries (both 11.1V) are being joined in **PARALLEL**. The result will be one 11.1V, 3000mAh battery.*

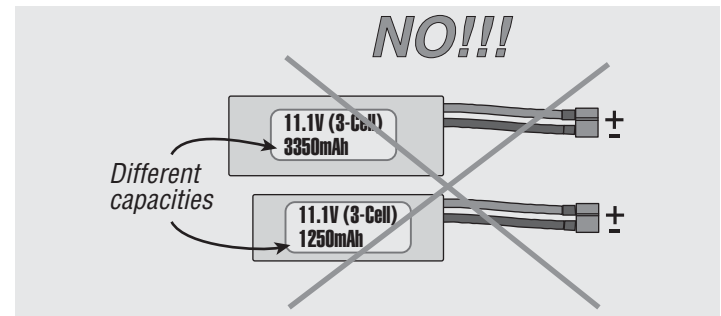


2. Connecting batteries in “**Parallel**” means to connect the (+)'s to the (+)'s and the (-)'s to the (-)'s. This combines the capacities of the batteries, but the voltage remains the same.



NEVER connect battery packs with different voltages in parallel! Only combine them in series. Otherwise, the

batteries with lower voltage will try to “equalize” with the batteries that have a higher voltage. Current will flow from the higher voltage battery into the lower one, essentially “charging” the lower voltage battery pack. This situation will likely cause heat and possibly a fire.

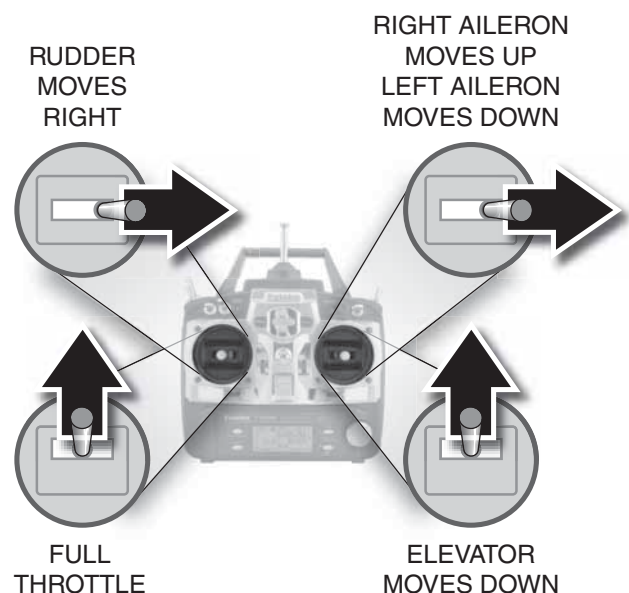


NEVER connect battery packs with different capacities in series or in parallel.

Check the Control Directions

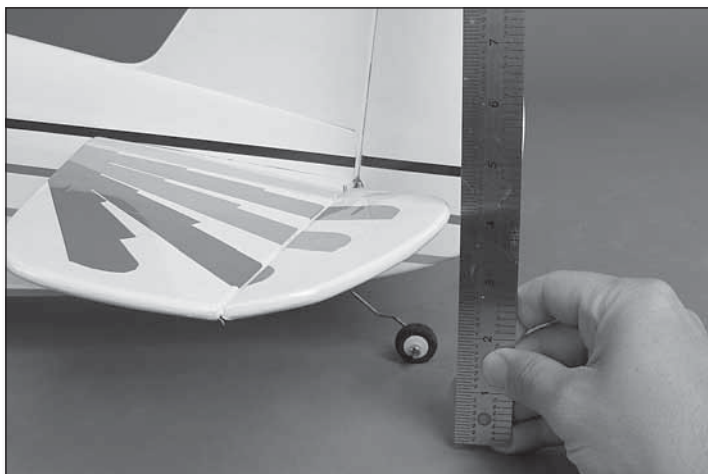
- ☐ 1. Turn on the transmitter and receiver and center the trims. If necessary, remove the servo arms from the servos and reposition them so they are centered. Reinstall the screws that hold on the servo arms.
- ☐ 2. With the transmitter and receiver still on, check all the control surfaces to see if they are centered. If necessary, adjust the clevises on the pushrods to center the control surfaces.

4-CHANNEL RADIO SET UP (STANDARD MODE 2)



- ☐ 3. Make certain that the control surfaces and the carburetor respond in the correct direction as shown in the diagram. If any of the controls respond in the wrong direction, use the servo reversing in the transmitter to reverse the servos connected to those controls. Be certain the control surfaces have remained centered. Adjust if necessary.

Set the Control Throws



Use a Great Planes AccuThrow (or a ruler) to accurately measure and set the control throw of each control surface as indicated in the chart that follows. If your radio does not have dual rates, we recommend setting the throws at the **low** rate setting.

NOTE: The throws are measured at the **widest part** of the elevators, rudder and ailerons.

These are the recommended control surface throws:

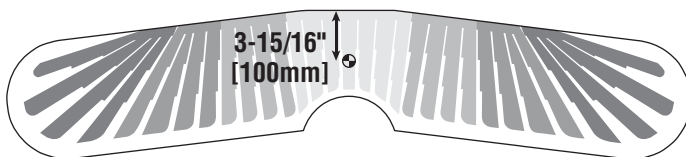
	HIGH RATE		LOW RATE	
	Up	Down	Up	Down
ELEVATOR	5/8"	5/8"	7/16"	7/16"
	[16mm]	[16mm]	[11mm]	[11mm]
	15°	15°	11°	11°
	Right	Left	Right	Left
RUDDER	1-1/8"	1-1/8"	1/2"	1/2"
	[29mm]	[29mm]	[13mm]	[13mm]
	20°	20°	9°	9°
	Up	Down	Up	Down
AILERONS	7/16"	7/16"	5/16"	5/16"
	[11mm]	[11mm]	[8mm]	[8mm]
	20°	20°	14°	14°

IMPORTANT: The Christen Eagle .46 ARF has been **extensively** flown and tested to arrive at the throws at which it flies best. Flying your model at these throws will provide you with the greatest chance for successful first flights. If, after you have become accustomed to the way the Christen Eagle flies, you would like to change the throws to suit your taste, that is fine. However, too much control throw could make the model difficult to control, so remember, "more is not always better."

Balance the Model (C.G.)

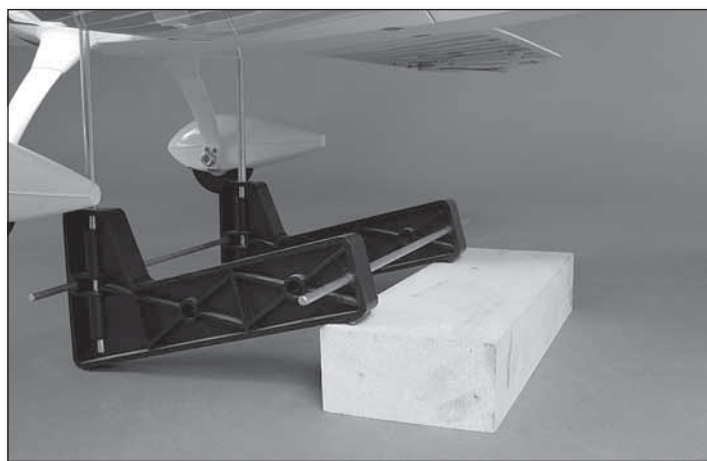
More than any other factor, the **C.G.** (balance point) can have the **greatest** effect on how a model flies, and may determine whether or not your first flight will be successful. If you value this model and wish to enjoy it for many flights, **DO NOT OVERLOOK THIS IMPORTANT PROCEDURE.** A model that is not properly balanced will be unstable and possibly unflyable.

At this stage the model should be in ready-to-fly condition with all of the systems in place including the engine or brushless motor, landing gear, and the radio system (and battery packs if applicable).



1. Use a felt-tip pen or 1/8" [3mm]-wide tape to accurately mark the C.G. on the bottom of the top wing on both sides of the fuselage. The C.G. is located 3-15/16" [100mm] back from the center of the top wing at the leading edge.

This is where your model should balance for the first flights. Later, you may wish to experiment by shifting the C.G. up to 1/8" [3mm] forward or 1/8" [3mm] back to change the flying characteristics. Moving the C.G. forward may improve the smoothness and stability, but the model may then require more speed for takeoff and make it more difficult to slow for landing. Moving the C.G. aft makes the model more maneuverable, but could also cause it to become too difficult to control. In any case, **start at the recommended balance point** and do not at any time balance the model outside the specified range. Please note that, unlike some models, this model has a very small balancing range which has been determined to be a safe range.



2. Because of the position of the landing gear and lower wing, the base of the Great Planes CG Machine™ must be raised on the aft end if you choose to use one. We used a block of wood approximately 2" [51mm] tall as shown.



❑ 3. With the wings attached to the fuselage, all parts of the model installed (ready to fly) and an empty fuel tank, place the model on your Great Planes CG Machine, or lift it at the balance point you marked.

❑ 4. If the tail drops, the model is “tail heavy” and the battery pack and/or receiver must be shifted forward or weight must be added to the nose to balance. If the nose drops, the model is “nose heavy” and the battery pack and/or receiver must be shifted aft or weight must be added to the tail to balance. If possible, relocate the battery pack and receiver to minimize or eliminate any additional ballast required. If additional weight is required, nose weight may be easily added by using a “spinner weight” (GPMQ4645 for the 1 oz. [28g] weight, or GPMQ4646 for the 2 oz. [57g] weight). If spinner weight is not practical or is not enough, use Great Planes (GPMQ4485) “stick-on” lead. A good place to add stick-on nose weight is to the firewall (don’t attach weight to the cowl—it is not intended to support weight). Begin by placing incrementally increasing amounts of weight on the bottom of the fuse over the firewall until the model balances. Once you have determined the amount of weight required, it can be permanently attached. If required, tail weight may be added by cutting open the bottom of the fuse and gluing it permanently inside. **Note:** Do not rely upon the adhesive on the back of the lead weight to permanently hold it in place. Over time, fuel and exhaust residue may soften the adhesive and cause the weight to fall off. Use #2 sheet metal screws, RTV silicone or epoxy to permanently hold the weight in place.

❑ 5. **IMPORTANT:** If you found it necessary to add any weight, recheck the C.G. after the weight has been installed.

Balance the Model Laterally

❑ 1. With the wing level, have an assistant help you lift the model by the engine propeller shaft and the bottom of the fuse under the TE of the fin. Do this several times.

❑ 2. If one wing always drops when you lift the model, it means that side is heavy. Balance the airplane by adding weight to the other wing tip. **An airplane that has been laterally balanced will track better in loops and other maneuvers.**

PREFLIGHT

Identify Your Model

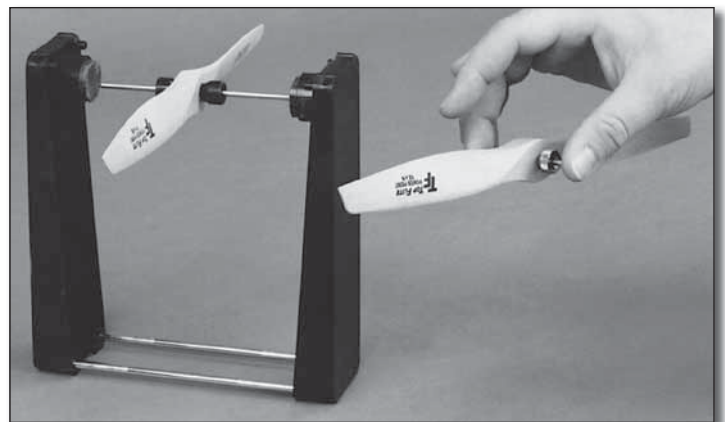
No matter if you fly at an AMA sanctioned R/C club site or if you fly somewhere on your own, you should always have your name, address, telephone number and AMA number on or inside your model. It is **required** at all AMA R/C club flying sites and AMA sanctioned flying events. Fill out the identification tag on page 35 (or on the decal sheet) and place it on or inside your model.

Charge the Batteries

Follow the battery charging instructions that came with your radio control system to charge the batteries. You should always charge your transmitter and receiver batteries the night before you go flying, and at other times as recommended by the radio manufacturer.

CAUTION: Unless the instructions that came with your radio system state differently, the **initial** charge on **new** transmitter and receiver batteries should be done for 15 hours **using the slow-charger that came with the radio system**. This will “condition” the batteries so that the next charge may be done using the fast-charger of your choice. If the initial charge is done with a fast-charger the batteries may not reach their full capacity and you may be flying with batteries that are only partially charged.

Balance Propellers



Carefully balance your propeller and spare propellers before you fly. An unbalanced prop can be the single most significant cause of vibration that can damage your model. Not only will engine mounting screws and bolts loosen, possibly with disastrous effect, but vibration may also damage your radio receiver and battery. Vibration can also cause your fuel to foam, which will, in turn, cause your engine to run hot or quit.

We use a Top Flite Precision Magnetic Prop Balancer (TOPQ5700) in the workshop and keep a Great Planes Fingertip Prop Balancer (GPMQ5000) in our flight box.

Ground Check

If the engine is new, follow the engine manufacturer's instructions to break-in the engine. After break-in, confirm that the engine idles reliably, transitions smoothly and rapidly to full power and maintains full power—indefinitely. After you run the engine on the model, inspect the model closely to make sure all screws remained tight, the hinges are secure, the prop is secure and all pushrods and connectors are secure.

Range Check

Ground check the operational range of your radio before the first flight of the day. With the transmitter antenna collapsed and the receiver and transmitter on, you should be able to walk at least 100 feet away from the model and still have control (if using a 2.4GHz radio system, refer to the radio manual for the range checking procedure). Have an assistant stand by your model and, while you work the controls, tell you what the control surfaces are doing. Repeat this test **with the engine running** at various speeds with an assistant holding the model, using hand signals to show you what is happening. If the control surfaces do not respond correctly, **do not fly!** Find and correct the problem first. Look for loose servo connections or broken wires, corroded wires on old servo connectors, poor solder joints in your battery pack or a defective cell, or a damaged receiver crystal from a previous crash.

ENGINE SAFETY PRECAUTIONS

Failure to follow these safety precautions may result in severe injury to yourself and others.

- Keep all engine fuel in a safe place, away from high heat, sparks or flames, as fuel is very flammable. Do not smoke near the engine or fuel; and remember that engine exhaust gives off a great deal of deadly carbon monoxide. Therefore **do not run the engine in a closed room or garage.**
- Get help from an experienced pilot when learning to operate engines.
- Use safety glasses when starting or running engines.
- Do not run the engine in an area of loose gravel or sand; the propeller may throw such material in your face or eyes.
- Keep your face and body as well as all spectators away from the plane of rotation of the propeller as you start and run the engine.
- Keep these items away from the prop: loose clothing, shirt sleeves, ties, scarves, long hair or loose objects such as pencils or screwdrivers that may fall out of shirt or jacket pockets into the prop.
- Use a "chicken stick" or electric starter to start the engine. Do not use your fingers to flip the propeller. Make certain the glow plug clip or connector is secure so that it will not pop off or otherwise get into the running propeller.

- Make all engine adjustments from behind the rotating propeller.
- The engine gets hot! Do not touch it during or right after operation. Make sure fuel lines are in good condition so fuel will not leak onto a hot engine, causing a fire.
- To stop a glow engine, cut off the fuel supply by closing off the fuel line or following the engine manufacturer's recommendations. Do not use hands, fingers or any other body part to try to stop the engine. Do not throw anything into the propeller of a running engine.

LITHIUM BATTERY HANDLING & USAGE

WARNING!! Read the entire instruction sheet included with your battery. Failure to follow all instructions could cause permanent damage to the battery and its surroundings, and cause bodily harm!

- **ONLY** use a Li-Po approved charger. **NEVER** use a NiCd/NiMH peak charger!
- **NEVER** charge in excess of 4.20V per cell.
- **ONLY** charge through the "charge" lead. **NEVER** charge through the "discharge" lead.
- **NEVER** charge at currents greater than 1C.
- **ALWAYS** set charger's output volts to match battery volts.
- **ALWAYS** charge in a fireproof location.
- **NEVER** trickle charge.
- **NEVER** allow the battery temperature to exceed 150° F (65° C).
- **NEVER** disassemble or modify pack wiring in any way or puncture cells.
- **NEVER** discharge below 2.5V per cell.
- **NEVER** place on combustible materials or leave unattended during charge or discharge.
- **ALWAYS KEEP OUT OF REACH OF CHILDREN.**

AMA SAFETY CODE (DWB DQOSR)

Read and abide by the following excerpts from the Academy of Model Aeronautics Safety Code. For the complete Safety Code refer to Model Aviation magazine, the AMA web site or the Code that came with your AMA license.

General

- 1) I will not fly my model aircraft in sanctioned events, air shows, or model flying demonstrations until it has been proven to be airworthy by having been previously, successfully flight tested.
- 2) I will not fly my model aircraft higher than approximately 400 feet within 3 miles of an airport without notifying the airport operator. I will give right-of-way and avoid flying in the proximity of full-scale aircraft. Where necessary, an observer

shall be utilized to supervise flying to avoid having models fly in the proximity of full-scale aircraft.

3) Where established, I will abide by the safety rules for the flying site I use, and I will not willfully and deliberately fly my models in a careless, reckless and/or dangerous manner.

5) I will not fly my model unless it is identified with my name and address or AMA number, on or in the model. **Note:** This does not apply to models while being flown indoors.

7) I will not operate models with pyrotechnics (any device that explodes, burns, or propels a projectile of any kind).

Radio Control

1) I will have completed a successful radio equipment ground check before the first flight of a new or repaired model.

2) I will not fly my model aircraft in the presence of spectators until I become a qualified flier, unless assisted by an experienced helper.

3) At all flying sites a straight or curved line(s) must be established in front of which all flying takes place with the other side for spectators. Only personnel involved with flying the aircraft are allowed at or in the front of the flight line. Intentional flying behind the flight line is prohibited.

4) I will operate my model using only radio control frequencies currently allowed by the Federal Communications Commission.

5) **I will not knowingly operate my model within three miles of any pre-existing flying site except in accordance with the frequency sharing agreement listed [in the complete AMA Safety Code].**

9) Under no circumstances may a pilot or other person touch a powered model in flight; **nor should any part of the model other than the landing gear, intentionally touch the ground, except while landing.**

CHECK LIST

During the last few moments of preparation your mind may be elsewhere anticipating the excitement of the first flight. Because of this, you may be more likely to overlook certain checks and procedures that should be performed before the model is flown. To help avoid this, a check list is provided to make sure these important areas are not overlooked. Many are covered in the instruction manual, so where appropriate, refer to the manual for complete instructions. Be sure to check the items off as they are completed.

- ☐ 1. Check the C.G. according to the measurements provided in the manual.
- ☐ 2. Be certain the battery and receiver are securely mounted in the fuse. Simply stuffing them into place with foam rubber is not sufficient.
- ☐ 3. Extend your receiver antenna.
- ☐ 4. Balance your model *laterally* as explained in the instructions.

- ☐ 5. Use threadlocking compound to secure critical fasteners such as the set screws that hold the wheel axles to the struts, screws that hold the carburetor arm (if applicable), screw-lock pushrod connectors, etc.
- ☐ 6. Add a drop of oil to the axles so the wheels will turn freely.
- ☐ 7. Make sure all hinges are **securely** glued in place.
- ☐ 8. Reinforce holes for wood screws with thin CA where appropriate (servo mounting screws, cowl mounting screws, etc.).
- ☐ 9. Confirm that all controls operate in the correct direction and the throws are set up according to the manual.
- ☐ 10. Make sure there are silicone retainers on all the clevises and that all servo arms are secured to the servos with the screws included with your radio.
- ☐ 11. Secure connections between servo wires and Y-connectors or servo extensions, and the connection between your battery pack and the on/off switch with vinyl tape, heat shrink tubing or special clips suitable for that purpose.
- ☐ 12. Make sure any servo extension cords you may have used do not interfere with other systems (servo arms, pushrods, etc.).
- ☐ 13. Secure the pressure tap (if used) to the muffler with high temp RTV silicone, thread locking compound or J.B. Weld.
- ☐ 14. Make sure the fuel lines are connected and are not kinked.
- ☐ 15. Balance your propeller (and spare propellers).
- ☐ 16. Tighten the propeller nut and spinner.
- ☐ 17. Place your name, address, AMA number and telephone number on or inside your model.
- ☐ 18. Cycle your receiver battery pack (if necessary) and make sure it is fully charged.
- ☐ 19. If you wish to photograph your model, do so before your first flight.
- ☐ 20. Range check your radio when you get to the flying field.

FLYING

The Christen Eagle .46 ARF is a great-flying model that flies smoothly and predictably. The Christen Eagle does not, however, possess the self-recovery characteristics of a primary R/C trainer and should be flown only by experienced R/C pilots.

Fuel Mixture Adjustments

A fully cowled engine may run at a higher temperature than an un-cowled engine. For this reason, the fuel mixture should be richened so the engine runs at about 200 rpm below peak speed. By running the engine slightly rich, you will help prevent dead-stick landings caused by overheating.

CAUTION (THIS APPLIES TO ALL R/C AIRPLANES): If, while flying, you notice an alarming or unusual sound such as a low-pitched “buzz,” this may indicate control surface *flutter*. Flutter occurs when a control surface (such as an aileron or elevator) or a flying surface (such as a wing or stab) rapidly vibrates up and down (thus causing the noise). In extreme cases, if not detected immediately, flutter can actually cause the control surface to detach or the flying surface to fail, thus causing loss of control followed by an impending crash. The best thing to do when flutter is detected is to slow the model **immediately** by reducing power, then land as soon as safely possible. Identify which surface fluttered (so the problem may be resolved) by checking all the servo grommets for deterioration or signs of vibration. Make certain all pushrod linkages are secure and free of play. If it fluttered once, under similar circumstances it will probably flutter again unless the problem is fixed. Some things which can cause flutter are; Excessive hinge gap; Not mounting control horns solidly; Poor fit of clevis pin in horn; Side-play of wire pushrods caused by large bends; Excessive free play in servo gears; Insecure servo mounting; and one of the most prevalent causes of flutter; Flying an over-powered model at excessive speeds.

Takeoff

Before you get ready to takeoff, see how the model handles on the ground by doing a few practice runs at **low speeds** on the runway. Hold “up” elevator to keep the tail wheel on the ground. If necessary, adjust the tail wheel so the model will roll straight down the runway. If you need to calm your nerves before the maiden flight, shut the engine down and bring the model back into the pits. Top off the fuel, then check all fasteners and control linkages for peace of mind.

Remember to takeoff into the wind. When you're ready, point the model straight down the runway, hold a bit of up elevator to keep the tail on the ground to maintain tail wheel steering, then gradually advance the throttle. As the model gains speed decrease up elevator allowing the tail to come off the ground. One of the most important things to remember with a tail dragger is to always be ready to apply **right** rudder to counteract engine torque. Gain as much speed as your runway and flying site will practically allow before gently applying up elevator, lifting the model into the air. At this moment it is likely that you will need to apply more right rudder to counteract engine torque. Be smooth on the elevator stick, allowing the model to establish a **gentle** climb to a safe altitude before turning into the traffic pattern.

Flight

For reassurance and to keep an eye on other traffic, it is a good idea to have an assistant on the flight line with you. Tell him to remind you to throttle back once the plane gets to a comfortable altitude. While full throttle is usually desirable for takeoff, most models fly more smoothly at reduced speeds.

Take it easy with the Eagle for the first few flights, gradually getting acquainted with it as you gain confidence. Adjust the trims to maintain straight and level flight. After flying around for a while and while still at a safe altitude with plenty of fuel, practice slow flight and execute practice landing approaches by reducing the throttle to see how the model handles at slower speeds. Add power to see how the model climbs as well. Continue to fly around, executing various maneuvers and making mental notes (or having your assistant write them down) of what trim or C.G. changes may be required to fine tune the model so it flies the way you like. Mind your fuel level, but use this first flight to become familiar with your model before landing.

Landing

To initiate a landing approach, lower the throttle while on the downwind leg. Allow the nose of the model to pitch downward to gradually bleed off altitude. Continue to lose altitude, but maintain airspeed by keeping the nose down as you turn onto the crosswind leg. Make your final turn toward the runway (into the wind) keeping the nose down to maintain airspeed and control. Level the attitude when the model reaches the runway threshold, modulating the throttle as necessary to maintain your glide path and airspeed. If you are going to overshoot, smoothly advance the throttle (always ready on the right rudder to counteract torque) and climb out to make another attempt. When you're ready to make your landing flare and the model is a foot or so off the deck, smoothly increase up elevator until it gently touches down. Once the model is on the runway and has lost flying speed, hold up elevator to place the tail on the ground, regaining tail wheel control.

One final note about flying your model. Have a goal or flight plan in mind for **every** flight. This can be learning a new maneuver(s), improving a maneuver(s) you already know, or learning how the model behaves in certain conditions (such as on high or low rates). This is not necessarily to improve your skills (*though it is never a bad idea!*), but more importantly so you do not surprise yourself by impulsively attempting a maneuver and suddenly finding that you've run out of time, altitude or airspeed. Every maneuver should be deliberate, not impulsive. For example, if you're going to do a loop, check your altitude, mind the wind direction (anticipating rudder corrections that will be required to maintain heading), remember to throttle back at the top, and make certain you are on the desired rates (high/low rates). A flight plan greatly reduces the chances of crashing your model just because of poor planning and impulsive moves. **Remember to think.**

Have a ball!

But always stay in control and fly in a safe manner.

GOOD LUCK AND GREAT FLYING!

OTHER PRODUCTS AVAILABLE FROM GREAT PLANES



Great Planes® 70" Revolver™ GP/EP ARF

The bigger, better Revolver!

Wingspan: 70 in (1780 mm)

Wing Area: 832 in² (53.7 dm²)

Weight: 8.5-9.3 lb (3850-4190 g)

Wing Loading: 24-26 oz/ft² (73-79 g/dm²)

Length: 58.5 in (1460 mm)

Requires: 4-channel radio w/5 servos,
2-stroke .61-.75 or 4-stroke .81-.91
engine **or** RimFire™ .80 outrunner BL
motor, 60A BL ESC (min) & two 11.1V
3200mAh LiPo batteries

When the original Revolver ARF was released in 2007, its racy, streamlined looks and outstanding aerobatics made it an instant best-seller. Then Great Planes developed something even bigger and better – the 70" span Revolver! It's even more impressive in the air, easier to track and less affected by wind. Capable of everything from simple sport flying to airshow-caliber maneuvers, this Revolver performs equally well with glow or electric power. The fiberglass cowl, wheel pants and landing gear are painted to match the eye-catching MonoKote® trim scheme. A pilot figure and aluminum spinner are included.

GPMA1019



Futaba® 6EX 2.4GHz Computer Radio

*Superior full-range capability
comes to 2.4GHz technology.*



Once you've experienced the 6EX 2.4GHz FASST system, you won't want to fly any other way! The secret is the all-in-one R606FS receiver: its compact size and light weight makes it easy to mount and perfect for park flyers — but it's also powerful enough to control any type of R/C aircraft, including electric, gasoline-powered and giant-scale planes as well as helis. You can fly without fear of signal conflict or the need for a frequency pin, because Continuous Channel Shifting makes interference virtually impossible, and Pre-Vision™ scans incoming data and applies corrections in advance. With Easy Link™, your receiver will respond only to your transmitter — and you'll enjoy a strong signal regardless of your plane's attitude because Dual Antenna Diversity seamlessly selects the best reception between two antennas. Equip your model with whatever Futaba servos it requires — the 6EX 2.4GHz FASST system is compatible with them all!

FUTK6900

O.S. Engine® 72FS-a 4-Stroke

Displacement: 0.719 cu in (11.8 cc)

Bore: 1.063 in (27 mm)

Stroke: 0.811 in (20.6 mm)

Weight w/muffler: 18.7 oz (530 g)

Practical rpm range: 2,400-12,500

Output: 1.2 hp @ 11,000 rpm

Includes: 61N carburetor, F-5030 muffler & F glow plug

It's a win-win for any pilot: a 4-stroke engine that fits in a .60-size space and offers the extra power needed for 3D and/or scale flying. Like the O.S. 56FS-a, 81FS-a and 110FS-a, the 72FS-a recirculates excess oil instead of venting it. That results in less mess and better lubrication. An extended venturi improves fuel/oil mixing, and the adjustable F-5030 muffler offers rich, deep sound and can be rotated 360° and moved in or out for a perfect fit.

OSMG0877

